Refine Search

Search Results -

Terms	Documents
L7 and (remote$ with diagnos$)	11

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L8

Refine Search

Recall Text | Clear | Interrupt

Search History

DATE: Wednesday, March 16, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L8	L7 and (remote$ with diagnos$)	11	L8
L7	L6 not l5	57	L7
L6	l3 and sens$	64	L6
L5	l4 and sens$	7	L5
L4	L3 and obd$	7	L4
L3	L1 and 701/32,35,29.ccls.	70	L3
L2	L1 and 701/?.ccls.	17	L2
L1	(vehicle same diagnostic$) and @ad<=19980725 and (internet or web or www or online or network$)	557	L1

END OF SEARCH HISTORY

L8: Entry 8 of 11 File: USPT Aug 12, 1997

US-PAT-NO: 5657224
DOCUMENT-IDENTIFIER: US 5657224 A

TITLE: Turf maintenance vehicle diagnostics and parameter condition logger

DATE-ISSUED: August 12, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lonn; Dana R.	Minneapolis	MN		
Wucherpfennig; Fredrick D.	Bloomington	MN		
Dunford; William M.	Minneapolis	MN		

US-CL-CURRENT: 701/29; 701/35, 701/50, 715/700

ABSTRACT:

The present invention provides for a turf maintenance vehicle controller which includes data logger means to store the status of predetermined parameters. The invention further includes the ability to provide such data in real time to an inexpensive diagnostic apparatus and to store the data for concurrent or later analysis by either the diagnostic apparatus or a remote microprocessor.

23 Claims, 22 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 19

L5: Entry 3 of 7 File: USPT Nov 10, 1998

US-PAT-NO: 5835871
DOCUMENT-IDENTIFIER: US 5835871 A

TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

DATE-ISSUED: November 10, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Smith; Mary V.	San Antonio	TX		
Frost; Mark D.	Piedmont	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Envirotest Systems, Inc.	Sunnyvale	CA			02

APPL-NO: 08/ 785098 [PALM]
DATE FILED: January 21, 1997

PARENT-CASE:
This is a continuation of application Ser. No. 08/414,925filed Mar. 31, 1995 U.S. Pat. No. 5,729,452.

INT-CL: [06] F02 B 27/04, G06 F 17/60

US-CL-ISSUED: 701/29; 701/30, 701/33, 701/34
US-CL-CURRENT: 701/29; 701/30, 701/33, 701/34

FIELD-OF-SEARCH: 364/424.034, 364/424.035, 364/434.038, 364/424.04, 364/551.01, 364/554, 364/580, 364/431.03, 364/431.04, 364/431.061, 364/431.062, 395/183.22, 395/613

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4175427	November 1979	Blanke	73/118
☐	4404639	September 1983	McGuire et al.	364/551
☐	4441359	April 1984	Ezoe	364/424.037

☐	4796206	January 1989	Boscove et al.	364/551.01
☐	4924095	May 1990	Seanson, Jr.	250/338.5
☐	4985857	January 1991	Bajpai et al.	364/551.01
☐	5010487	April 1991	Stonehocker	364/424.034
☐	5099437	March 1992	Weber	364/550
☐	5229942	July 1993	Nicholson et al.	364/424.03
☐	5245554	September 1993	Tsuyama et al.	364/552
☐	5272769	December 1993	Strnatka et al.	395/161
☐	5404503	April 1995	Hill et al.	395/183.07
☐	5414626	June 1995	Boorse et al.	364/424.03
☐	5479359	December 1995	Rogero et al.	364/496
☐	5572424	November 1996	Kellogg et al.	364/424.034
☐	5593567	January 1997	Jessup et al.	208/46
☐	5657233	August 1997	Cherrington et al.	364/551.01

ART-UNIT: 364

PRIMARY-EXAMINER: Nguyen; Tan Q.

ATTY-AGENT-FIRM: Marger, Johnson, McCollom & Stolowitz, P.C.

ABSTRACT:

Disclosed is a system and method which systematically diagnoses emissions test failure by applying the rules of a knowledge base to predict the cause of vehicle emissions failures. Classifiers are used to form predictions. The classifier is the data structure used in the automobile emission testing inspection lane by the lane diagnostic subsystem to provide a diagnosis for a particular vehicle. Its output is the likelihood that a vehicle suffers from a given failure based on the values of characteristics such as its emissions test results and the vehicle's description. The classifier predictions are then used to prepare a failure report that is given to the motorist for use by his or her repair technician. In another feature of this invention, the classifiers are continuously updated in a learning process based on new repair records. The learning processes periodically analyzes the data and updates the knowledge base to include new or revised classifiers.

20 Claims, 16 Drawing figures

Previous Doc Next Doc Go to Doc#

Hit List

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 7 of 7 returned.

☐ 1. Document ID: US 5957985 A

L5: Entry 1 of 7 File: USPT Sep 28, 1999

US-PAT-NO: 5957985
DOCUMENT-IDENTIFIER: US 5957985 A

TITLE: Fault-resilient automobile control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | [illegible] | Claims | KWIC | Draw De

☐ 2. Document ID: US 5941918 A

L5: Entry 2 of 7 File: USPT Aug 24, 1999

US-PAT-NO: 5941918
DOCUMENT-IDENTIFIER: US 5941918 A

TITLE: Automotive on-board monitoring system for catalytic converter evaluation

Full | Title | Citation | Front | Review | Classification | Date | Reference | [illegible] | Claims | KWIC | Draw De

☐ 3. Document ID: US 5835871 A

L5: Entry 3 of 7 File: USPT Nov 10, 1998

US-PAT-NO: 5835871
DOCUMENT-IDENTIFIER: US 5835871 A

TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

Full | Title | Citation | Front | Review | Classification | Date | Reference | [illegible] | Claims | KWIC | Draw De

☐ 4. Document ID: US 5729452 A

L5: Entry 4 of 7 File: USPT Mar 17, 1998

US-PAT-NO: 5729452
DOCUMENT-IDENTIFIER: US 5729452 A

TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. D

☐ 5. Document ID: US 5650930 A

L5: Entry 5 of 7 File: USPT Jul 22, 1997

US-PAT-NO: 5650930
DOCUMENT-IDENTIFIER: US 5650930 A

TITLE: Apparatus and method responsive to the on-board measuring of haulage parameters of a vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. D

☐ 6. Document ID: US 5528499 A

L5: Entry 6 of 7 File: USPT Jun 18, 1996

US-PAT-NO: 5528499
DOCUMENT-IDENTIFIER: US 5528499 A

TITLE: Apparatus and method responsive to the on-board measuring of haulage parameters of a vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. D

☐ 7. Document ID: US 5459660 A

L5: Entry 7 of 7 File: USPT Oct 17, 1995

US-PAT-NO: 5459660
DOCUMENT-IDENTIFIER: US 5459660 A

TITLE: Circuit and method for interfacing with vehicle computer

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. D

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L4 and sens$	7

L5: Entry 3 of 7 File: USPT Nov 10, 1998

DOCUMENT-IDENTIFIER: US 5835871 A
TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

Abstract Text (1):
Disclosed is a system and method which systematically diagnoses emissions test failure by applying the rules of a knowledge base to predict the cause of vehicle emissions failures. Classifiers are used to form predictions. The classifier is the data structure used in the automobile emission testing inspection lane by the lane diagnostic subsystem to provide a diagnosis for a particular vehicle. Its output is the likelihood that a vehicle suffers from a given failure based on the values of characteristics such as its emissions test results and the vehicle's description. The classifier predictions are then used to prepare a failure report that is given to the motorist for use by his or her repair technician. In another feature of this invention, the classifiers are continuously updated in a learning process based on new repair records. The learning processes periodically analyzes the data and updates the knowledge base to include new or revised classifiers.

Application Filing Date (1):
19970121

Brief Summary Text (10):
This invention includes the preparation of a diagnostic report with a diagnostic assessment for a vehicle owner to use in repairing his or her vehicle to bring its emissions into compliance with emission standards. The diagnostic assessment gives the vehicle owner's service technician probabilistic information about the likely causes of the vehicle's failure of the emissions test. The diagnosis is derived from operations involving a classifier table which stores previously derived rules which form the basis for the prediction of the diagnostic assessment. If a vehicle which previously failed the emission test finally passes, information relating to the passing test is used to update the classifier table.

Brief Summary Text (11):
More particularly, a classifier of the classifier table is the data structure used in the automobile emission testing inspection lane by the lane diagnostic subsystem, which runs on the lane controller computer, to provide a diagnosis for a particular vehicle. It allows a quick evaluation of the likelihood that a vehicle suffers from a given failure based on the values of characteristics such as its emissions test results and the vehicle's description.

Brief Summary Text (13):
In another feature of this invention, the classifiers are continuously updated in a learning process based on new repair records. The learning process periodically analyzes the repair data and updates the knowledge base to include new or revised classifiers. The learning process will explore, identify and predict failures that correlate with parameter such as the following: vehicle make and model year; vehicle mileage; on-board-diagnostics (OBD) data; emissions composite values; and emissions second-by-second values.

Brief Summary Text (14):

The learning process can be described in terms of its inputs, outputs and functions. The inputs to the learning process utility are suitably prepared data from the following: vehicle test records; vehicle emissions repair records; and diagnostic records. The outputs to the learning process utility are for example: new classifiers; learning process log entry; administrative report; and a pattern report. The general functions of the learning process are to describe the data, determine patterns of significance, and create a classification data structure (classifier) and mechanisms for applying the classifier in a predictive mode. The predictive accuracy of the classifier is evaluated periodically using a dataset representative of current program vehicles. The classifier is updated as needed to maintain or improve accuracy.

Detailed Description Text (2):
This description is broken down into three distinct sections. The first section describes the emissions testing process in general with reference to the initial diagnostic assessment feature of the this invention. The second section describes the learning process feature of the this invention which uses among other things, data emissions testing information generated from retests of previously failed vehicles to update the classifiers used to make initial diagnostic assessment. The third section ties the elements of the first section and the second section together with reference to the interaction of this invention with the operations of an inspection lane.

Detailed Description Text (7):
In the system of the this invention, the processor 26, provides a diagnostic assessment 32. In a first situation, the diagnostic assessment is provided in the event of a failure of a vehicle to pass emissions test.

Detailed Description Text (10):
Controller software 27 causes the emissions data or similar data shown in FIGS. 2a-2f to be formatted in a manner so that it can be compared to the classifiers stored in classifier table 41. Comparator 42 runs an algorithm so that processor 26 generates diagnostic assessment 32 for an individual vehicle.

Detailed Description Text (16):
FIGS. 3a-d combined show an example of a repair strategy report providing diagnostic assessment 32 (see FIG. 1) as output of the classifier table. For a 1984 Nissan truck with an idle HC=629, idle CO=8.49 and idle O.sub.2 =9.7 two failure categories (ignition failure probability (FIG. 3a) and air induction failure probability (FIG. 3c)) are generated using characteristics of the vehicle and emissions data which satisfy the classifier table.

Detailed Description Text (22):
Below is a listing of potential failure categories and subcategories which reflect groups of repair actions that exhibit similar symptoms. These are subject to change in size and content depending on the learning process performance discuss below. Subcategories are lowest level of information. The level of information provided as a diagnostic assessment is dependent upon the correlations which can be drawn during the learning process discussed below. This is also constrained by the repair actions, the lowest level of detail given on the vehicle emissions repair report. The failure categories and the repair actions corresponding to each category are for example:

Detailed Description Text (24):
Standardization of repair information and consistency is preferable. To provide consistency, where the repair technician is equipped with appropriate computer hardware and software, diagnostic assessments are presented electronically, and via dial-up phone line, for example, by Internet data delivery. The diagnostic assessments are also provided on a printed failure report at the inspection lane which the vehicle owner presents to the repair technician.

Detailed Description Text (25):
As discussed above, the classifier table 41 has been previously built and stored for access during processing by comparator 42. Accordingly, the classifier table 41 provides the ability of this invention to "close the loop" between the repair mechanic and the inspection system by providing increasingly accurate diagnostic and repair statistics to increase the success rate of the repair process, bringing more vehicles into compliance under waiver limits.

Detailed Description Text (27):
Looking at the overall process of this invention, including the update feature is provided by FIGS. 4a and 4b where FIG. 4a shows the system and FIG. 4b provides a legend for the path configurations. The vehicle 12 visits the inspection station 20 and receives a failure report with diagnostic assessment 31. The vehicle visits the repair facility 25 and receives repairs, such as those most likely including those suggested by the failure report 31 as discussed in detail above. The repair facility 25 generates a repair report 46 and the inspection station 20 retests the vehicle 12. That retest information 51 is sent to the host 28 along with vehicle emissions repair reports 52 to be gathered as part of host databases 53. The learning process 60 performs as described below and updated classifier data files are transferred 61 to the inspection station and processor 26.

Detailed Description Text (28):
By capturing information regarding repairs 46 performed on vehicles that fail emissions inspections, and then retesting the vehicle by emission analysis system 10, information is provided to processor 26 which is collected and used to update the classifier table during the learning process. Performed repair data 46 is input to the host 28 so that it corresponds unambiguously with the vehicle test results record 31 and diagnostic assessments 32.

Detailed Description Text (31):
Suitable data are selected, files are assembled and written out to a file for vehicle records meeting the learning process criteria. There are several separate types of functions performed including: creating reports that monitor the effectiveness of the learning process and the diagnostic assessments issued; filtering vehicle records for learning; assembling a data record in a temporary table for acceptable vehicles including formatting and checking failed values; copying the contents of the temporary table data to an input file for the learning process; creating additional data files for use in the lane diagnostic subsystem.

Detailed Description Text (33):
Turning to FIG. 5, there is shown a systematic diagram of how the host diagnostic system performs updates of the classifier table's knowledge base. The update is an ongoing process of "learning": the statistical module which receives new data 53 including actual repair data from retested vehicles; and data from other testing programs in the form of individual records (as discussed above); filtering for errors and weighting the data 66 according to its value or ordering its application so that more credible measures have a greater influence in forming the diagnosis; formatting and compressing data 67 so that it is in a form which can be correlated; correlating the actual repairs with the predictors to create rules 76; compressing and concatenating the rules 69 to provide data structures for individual failures and provide compaction of the data structure; testing the compacted classifiers to determine accuracy 79; updating the knowledge base for distribution to all locations where it resides. The frequency of the updates is adjustable. The determination of which data to use and how to format it is nontrivial. In one embodiment, the OBD data is included in the learning process. In a different embodiment, the vehicle's OBD overrides some or all probabalistic predictions.

Detailed Description Text (34):
Each element of the update feature as outlined above is now discussed in more

detail. Returning first the statistical module 53, the statistics given here are descriptive in nature and are formatted and output in the repair effectiveness report in the form of an administrative report 54. The values are preferably computed for the data collection period input by the user to cover the learning process. These vary by emissions testing program and may include the following: number of failing vehicles broken down by type of failure (standard failed) and test regime applied; number of failure reports 31; description of OBD operations performed and results, including retest success/failure rates; frequency distribution of vehicle emissions repair report 46; frequency distribution of vehicle emissions repair report 46 failure categories for all failed/repair vehicles; and frequency distribution of multiple retest repair actions (hard-to-diagnose repairs) by subsequent retest result (repairs made followed by failing retest and hard-to-fix repairs made followed by passing retest).

Detailed Description Text (100):
Three types of data files are routinely transferred from the host to the inspection lane processor 26 (see FIG. 1) at each inspection state; the classifier table files on the learning process 68 and the frequency distribution file 56 and repair action/Failure category file 57 from the host computer 28. There are at least two methods for doing this transfer, that is, floppy and network methods.

Detailed Description Text (101):
The network method is as follows. The files containing the classifier tables are transferred via ftp. from the learning process 68 to the host. Host files are transferred from the host to the lane 20 via established network communications.

Detailed Description Text (102):
The second method of the file transfer is via floppy disk. The data processing manager at the host in such a case would copy the file to a floppy disk and transport that disk to the station housing the lane processor 26. The floppy method is a backup method in case the network is down.

Detailed Description Text (113):
Preferably, the host will issue periodic administrative reports 54 and learning process log entries 83 sufficient to monitor the effectiveness of the diagnostic system and pattern reports to document vehicle test and repair trends found in the data. The frequency of report generation and learning process will be adjusted.

Detailed Description Text (114):
The administrative reports 54 and learning process log 83 include the number of diagnostic reports being issued, the principal measures used to generate them (e.g. OBD used), and their accuracy as documented by repair information gained on their reinspection. Analysis of diagnostic accuracy will show the distribution (e.g. make/model/year) over vehicle type in enough detail to monitor vehicle coverage.

Detailed Description Text (118):
The existing lane controller 27 performs the vehicle emissions test. The lane controller 27 also makes a request to the OBD module 93 to determine the status of the vehicle's on-board diagnostic system MIL (malfunction indicator light), when applicable, and downloads the OBD diagnostic trouble codes and sensor data resident in the OBD computer memory as a result of the malfunctions. The OBD module 93 may also access real-time sensor data generated by the vehicle OBD computer as an input to the diagnostic subsystem.

Detailed Description Text (119):
The lane controller 27 issues a diagnosis request to the diagnostic controller 91 when a vehicle has failed the inspection process. The request is accompanied by vehicle characteristics and test data needed as input to the failure analysis module 97. Under certain circumstances, selected vehicle OBD sensor data is input to the failure analysis module 97.

Detailed Description Text (120):
The failure analysis module 97 formats the data for compatibility with the classifier table files 41, including computing derived values from I/M 240 second-by-second data where applicable. The failure analysis module 41 performs a lookup in the appropriate classifier table file and retrieves a failure probability for each failure category to be diagnosed. The categories are ranked according to the probability and input to the diagnostic integration module 98. The diagnostic integration module 98 reconciles the probabilistic results with recent repairs made to the vehicle (for those undergoing multiple test failures) and OBD diagnostic trouble codes retrieved from the vehicle (under circumstances where OBD input is used). The integrated diagnosis is sent to the failure report module 99 for creation of the report.

Detailed Description Text (121):
Here, symptoms associating this vehicle with each failure category are retrieved from the classifier table 41 and converted to an English-language phrase by the justification module In FIG. 7 some of the elements shown in FIG. 5 and FIG. 1 are shown in combination 103. Also, the relative incidence of failure in the general failure population for each failure category is retrieved from the failure frequency distribution file 56 for including in the failure report. Moreover, included in the failure report are the plots of the vehicle's emissions results compared with a typical passing vehicle and any OBD results obtained. The failure report 31 and 32 is created and given to the motorist for use by his or her repair technician.

Detailed Description Text (122):
Turning to the details of the features shown in FIG. 7, the OBD module is first discussed. Generally, the data gathered at the lane 20 such as diagnostic 92 and OBD 93 records are also uploaded to the host in order to recreate any failure report. The contents of the OBD record 93 shall include the diagnostic trouble codes and the frames of data from the OBD session. The diagnostic data 27 items include the version number of the classifier, failure categories, and associated probabilities of failure. These data items are sent to the host and stored in a database table on the host computer.

Detailed Description Text (125):
The controller 27 will be implemented as an independent task. This task will be invoked when the vehicles gets to a position where the report needs to be generated. The diagnostic controller 91 accepts a diagnostic request from the lane 20 controller 27 This request indicates that failure analysis should now be performed.

Detailed Description Text (126):
The calling sequence of the controller 27 is as follows: upon receiving a diagnostic request, the controller invokes the failure analysis module 97, which reads in the necessary data and performs the failure analysis. The failure analysis module 97 invokes the diagnostic integration module 98, which integrates information concerning repairs that have already been done for the current vehicle being tested and the OBD test results. The diagnostic integration module 98 invokes the failure report module 99, which produces a failure report 31.

Detailed Description Text (131):
Turning to the OBD module 93, it maps diagnostic trouble codes observed onto the failure category file 57. Failure prediction is suppressed for those failure categories, similar to the multiple retest method. Other embodiments include suppression of a diagnostic assessment or the use of the retrieved OBD sensor data as inputs to the failure analysis module 97 for all vehicle supporting OBD.

Detailed Description Text (132):

The OBD module 93 performs downloading of the data from the vehicle. If the vehicle supports OBD, a message is sent to the lane 20 inspector instructing him or her to inspect OBD MIL status and functionality. After the lane 20 inspector connects the OBD cable to the vehicle and initiates downloading, OBD data is down loaded into a table on the lane 20 called OBD table 102. Two kinds of data are downloaded: diagnosis trouble codes and frames of sensor data.

Detailed Description Text (133):
The integration function of the OBD module 93 involves mapping the OBD diagnostic trouble codes to failure categories. Each diagnostic trouble code is mapped to a failure category in the table 57 in the following manner: for each diagnostic trouble code, a corresponding failure category is mapped in the adjacent column of the OBD table. A data table is available that associates all diagnostic trouble codes to failure category if one exists.

Detailed Description Text (134):
The OBD module 93 operations supplies functions to access the OBD table 102. The diagnostic trouble code and associated failure category are found in this table. Functions such as init, add, delete are supplied for this table. Module 93 also supplies functions to build an OBD record from information in the OBD table and to send this record for storage in the OBD database.

Detailed Description Text (135):
Turning to the diagnostic integration module 98, this module integrates the probabalistic failure analysis results with other sources of information available about the vehicle. For vehicles undergoing a second (or greater number) retest, there is a possibility that data will conflict. To avoid that possibility steps can be taken.

Detailed Description Text (137):
Another source of possibly conflicting information about the vehicle is the OBD data retrieved from the on-board computer. This is one possible means of integration. The diagnostic integration module invokes a function in the OBD module that maps the OBD diagnostic trouble codes to corresponding categories. Each failure found in the OBD table is compared with the failures found in the failure probability table 101. If a match exists and the failure probability of the matching failure in the failure probability table 101 is less that some threshold probability value, then that failure is deleted from the failure probability table.

Detailed Description Text (140):
The failure categories and the corresponding probabilities are retrieved from the failure probability table 101. The failure categories and failure probabilities are shown ranked from most likely to least likely. Also given is the frequency with which this failure category occurs in the failed vehicle general population (retrieved from the failure frequency distribution file 56). For each failure category in the failure report, there is a justification stating the vehicle's symptoms that are associated with that category. The justification is supplied by the justification module 103 and will be in the form of an English-like phrase. Moreover, OBD codes and data are also read from the OBD table 102 and inserted into the failure report.

Detailed Description Text (145):
To help the motorist whose vehicle failed the emissions test understand the diagnostic assessment relating to his or her vehicle, a preprinted brochure is given to that motorist. The brochure explains the probabilistic approach taken and the error expected. It also serves as a key to the failure categories used in the report and states which repair actions make up each failure category.

Detailed Description Text (146):

Accordingly, in summary, the above detailed description has described the features of this invention including the preparation of a diagnostic report with a diagnostic assessment for a vehicle owner to use in repairing his or her vehicle to bring its emissions into compliance with emission standards. That is, the diagnostic assessment gives the vehicle owner's service technician probabilistic information about the likely causes of the vehicle's failure of the emissions test. The description also has shown how the diagnosis is derived from operations involving a classifier table which stores previously derived rules which form the basis for the prediction of the diagnostic assessment. Also, included is a detailed description of how an updated classifier table is generated where a vehicle which previously failed the emission test finally passes and how the information relating to the passing test is used to update the classifier table.

Detailed Description Paragraph Table (1):

fuel.sub.-- delivery carburetor adjustment speed adjustment carburetor choke cold start fuel filter hoses injector cleaning injector(s) inlet restrictor pump regulator motor/valve/solenoid tank air injection belt check valve control pump tubes valves ignition cap/rotor coil distributor initial timing module plugs spark advance control wires egr control system passage/hose sensor valve evaporation carbon canister control filter hoses gas cap purge valve catalytic converter converter heat shield preheat catalytic converter air.sub.-- induction air filter ducts sensor thermostatic air door throttle bore oil change HI CO could put in oil & coolant level diluted oil pcv crankcase ventilation hose passage valve electronic.sub.-- control air control canister purge control coolant sensor ECM EGR control idle control MAP sensor/switch mass air flow sensor mixture control pressure sensor PROM RPM sensor/switch spark control temp sensor/switch throttle position sensor/switch vehicle speed sensor O.sub.2 sensor O.sub.2 sensor exhaust exhaust components manifolds vacuum.sub.-- leak vacuum leak engine.sub.-- mech valve valve timing

Current US Original Classification (1):
701/29

Previous Doc Next Doc Go to Doc#

DOCUMENT-IDENTIFIER: US 5459660 A
TITLE: Circuit and method for interfacing with vehicle computer

Abstract Text (1):
An interface circuit for providing signals necessary to monitor one or more on-board vehicle computers through a serial communication link between an off-board controller and the on-board vehicle computer. The interface circuit is provided on the vehicle in order to provide the command signals to the off-board controller which will enable a standard monitoring device to read key information from the on-board vehicle computer. Additionally, the interface circuit also provides support of a second mode of operation that conforms to a proprietary communications protocol. The interface circuit automatically recognizes and adapts to the proper communication protocol for the tool sensed. The interface circuit complies with both a proprietary communication protocol and with an ISO 1941 format which satisfies an OBDII/CARB specification which all automobiles sold in the United States must comply with by the 1996 model year.

Application Filing Date (1):
19931222

Brief Summary Text (5):
One example of an appropriate vehicle bus structure is represented by the Chrysler Collision Detection ("C.sup.2 D") Serial Data Bus. This technology is described in the following publications and patents: SAE paper No. 860389, entitled "Chrysler Collision Detection (C.sup.2 D)--A Revolutionary Vehicle Network", by Frederick O. R. Miesterfeld, 1986; SAE paper No. 890529, entitled "The All-Adaptive Controls for the Chrysler Ultradrive Transaxle", 1989; U.S. Pat. No. 4,706,082, entitled "Serial Data Bus For Intermodule Data Communications," which issued on Nov. 10, 1987; and U.S. Pat. No. 4,719,458, entitled "Method of Data Arbitration and Collision Detection In A Data Bus," which issued on Jan. 12, 1988; and U.S. Pat. No. 4,739,323, entitled "Serial Data Bus For Serial Communication Interface (SCI), Serial Peripheral Interface (SPI) and Buffered SPI Modes of Operation," which issued on Apr. 19, 1988; and U.S. Pat. No. 4,739,324, entitled "Method for Serial Peripheral Interface (SPI) in a Serial Data Bus," which issued on Apr. 19, 1988; and U.S. Pat. No. 4,742,349 entitled "Method for Buffered Serial Peripheral Interface (SPI) in a Serial Data Bus", which issued on May 3, 1988. These co-assigned patents and the identified publications are all hereby incorporated by reference.

Brief Summary Text (6):
In this regard, it should be noted that the engine controller and the transmission controller discussed in the above referenced U.S. Pat. No. 4,875,391 are both connected to the C.sup.2 D Serial Data Bus. This Serial Data Bus may also be accessible to off-board vehicle computers through one or more diagnostic connectors on the vehicle. In this regard, it should be appreciated that any vehicle bus structure needs to be accessible to off-board computer systems in order to permit the bus itself to be tested and permit direct access to and communication with any of the vehicle computers tied to the vehicle bus. An example of the use of an off-

board diagnostic tool used to monitor and program an on-board vehicle computer is the Berra et. al. U.S. Pat. No. 5,278,759, issued on Jan. 11, 1994, and entitled "System and Method for Reprogramming a Vehicle Computer". This commonly assigned patent is hereby incorporated by reference.

Brief Summary Text (7):
In addition, one or more of these vehicle diagnostic connectors also typically provide separate communication links or channels with both the vehicle's engine control computer and the vehicle's transmission control computer. These separate communication links are generally designed to conduct serial communications directly with these particular on-board vehicle computers during certain diagnostic procedures.

Brief Summary Text (8):
In any event, diagnostic connectors have been employed since engine computers were first used on vehicles to permit communication between on-board and off-board computers. Thus, for example, data being gathered by the on-board vehicle computer from various sensors (such as engine speed and manifold pressure) may be transmitted to an off-board computer for programmed or operator analysis.

Brief Summary Text (9):
In response to the heavy reliance on on-board computers, combined with a variety of systems employed by the various automobile manufacturers, future vehicles sold in the United States will soon have to provide a standardized diagnostic interface. This restriction is referred to as the OBDII/CARB requirement and includes new vehicles beginning in 1994 model year and all vehicles in the 1996 model year. The OBDII/CARB requirement offers a choice between a J1850 specification and an ISO9141 specification. The OBDII requirement, the J1850 standard, and the ISO9141 are hereby incorporated by reference.

Brief Summary Text (10):
Accordingly, it is a principal objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool.

Brief Summary Text (11):
It is a more specific objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that is compatible with an existing proprietary communication system.

Brief Summary Text (12):
It is another objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that is additionally compatible with an ISO9141 specification which satisfies an OBDII/CARB requirement.

Brief Summary Text (13):
It is yet another objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that automatically recognizes and adapts to a proprietary communication system or an ISO9141 compatible system depending on which system is connected to the on-board vehicle computer.

Brief Summary Text (15):
To achieve the foregoing objectives, the present invention provides a system and method for providing signals necessary to monitor one or more on-board vehicle computers through a serial communication link between an off-board controller and the on-board vehicle computer. The interface circuit is provided on the vehicle in order to provide the command signals which will enable a standard monitoring device

to read key information from the on-board vehicle computer. The interface circuit complies with both a proprietary diagnostic tool and with an ISO9141 format which satisfies an OBDII/CARB specification to which all automobiles sold in the United States must comply with by the 1996 model year.

Brief Summary Text (16):
In one form of the present invention, the off-board controller is comprised of a diagnostic tool which includes a portable housing, a computer based control circuit contained in the housing and a plug-in memory module which is removably secured to the portable housing. The communication link between the diagnostic tool and the vehicle signal transfer structure is provided by a cable structure that includes an in-line adapter for providing the voltage level required for at least one of the command signals. The cable structure is removably connected to the diagnostic connector of the vehicle which provides access to the vehicle signal transfer structure.

Detailed Description Text (3):
A diagnostic connector 22 is connected to the engine controller 12 through the vehicle signal transfer structure 16. The diagnostic connector 22 includes electrical conduits which lead directly to the engine controller 12. In this regard, the cable 24 leading from the diagnostic connector 22 to the signal transfer structure 16 provides a bi-directional communication channel between the engine controller 12 and an off-board computer. FIG. 1 also shows a body diagnostic connector 26 which provides access to the C.sup.2 D bus of the vehicle signal transfer structure 16.

Detailed Description Text (5):
The DRB II diagnostic unit 28 includes a portable housing 36 which may be hand held near or in the vehicle 10 by a service technician. The front panel 38 of the DRB II unit includes a keypad 40 for entering data or instructions in an interactive communication process with the DRB II unit. In this regard, the DRB II unit includes a display 42 which is capable of visibly displaying several lines of character and numeric information. Thus, for example, the DRB II unit may prompt the service technician to enter particular information from the keypad 40 by producing a specific request on the display 42. A connector 312 is connected to a positive battery terminal J2 to supply voltage to the DRBII diagnostic tool 28 through the diagnostic connector 22.

Detailed Description Text (16):
The edge detect logic 106, in combination with the filtering logic 108, provides the necessary intelligence to enable the interface circuit 34 to sense either a proprietary DRB-II diagnostics tool or an ISO9141 compatible diagnostics tool and shift automatically into either SCI II mode or ISO9141 mode, depending upon the mode being utilized by the tool. The Z141 collage chip, illustrated in greater detail in FIG. 3, receives an input signal on line 318 through input port PC5. The input signal is passed to edge detect input circuitry 322 which buffers the input signal and senses a logic level change from either "high" to "low" or "low" to "high". The output signal from edge detect input circuitry 322 is then exclusive ORed at exclusive OR gate 324 with a signal output from an edge trigger control register 326 which enables the detection of the logic level transition of either a "rising" edge or "falling" edge. A status flag register 330, in cooperation with trigger control register 326 and decode logic circuitry 328, are used to detect a desired transition and then latch to the new state. The status flag register 330 confirms that a transition has taken place. Decode logic 328 enables the edge trigger control register 326 to be either read or written to and directs information onto bus 320.

Detailed Description Text (18):
When an ISO9141 test tool is connected, resistor 145 is supplied with approximately battery potential. This reference battery potential is divided by two by resisters

R256 and R285 and sent to the inverting input of the comparator section 121. The edge detect input port PC5 will sense a "low" signal from the comparator section 121. Based on these signals, the interface circuit 34 automatically recognizes an ISO9141 compatible diagnostic tool has been connected and shifts into the appropriate mode. The receive input port RXD continues to be in its initially disabled state caused by output compare port OC1. The diagnostic tool will send an identifier byte at 5 baud. If the microprocessor recognizes the identification based on the PC5 input sense of the collage, output compare port OC1 will be driven "high" and the receive bus path 114 will be enabled allowing data to pass to the microprocessor 13. From this point, output compare port OC1 will idle in a "high" state and ISO9141 messages will continue to be received by the microprocessor 13.

Detailed Description Text (19):
When the microprocessor 13 desires to transmit a message to the diagnostics test tool 28, the receive logic 122 filters out an echo created by the single-wire bi-directional configuration of the ISO9141 bus. This is accomplished by using output compare port OC1 to hold a "low" value for a period slightly longer than the length of the data transmission. Just prior to the SCI transmit, the output compare port OC1 toggles "low", disabling the receive bus path 114 from sensing the transmission. Shortly after the data transmission is complete, the output compare port OC1 toggles times out and "high", thereby re-enabling the receive bus path 114. This filtering process relieves the microprocessor 13 from clearing its internal receive register.

Detailed Description Text (20):
In the SCI II mode the initial reset status of the interface circuit 34 is identical to the reset status while in the ISO9141 mode of operation. The transmit output port TXD from the microprocessor 13 idles in a "high" state causing the transmit bus 116 to remain in a tri-state level. The output compare port OC1 idles in a "low" state to disable any messages from the transmit output port TXD from accessing the input port RXD of the microprocessor 13. The edge detect logic 106 will idle "high" when the interface circuit 34 is in the SCI II mode. The SCI II communication tool operates at a 5 V DC level which will not be sensed through the comparator circuitry 121, provided the battery voltage is above 10 volts DC.

Detailed Description Text (22):
The interface circuit 34 will also operate in a bootstrap mode, when necessary, to reprogram microprocessor 13 in a manner like that discussed in the referenced patent entitled "System and Method for Reprogramming a Vehicle Computer". In the bootstrap mode, the microprocessor 13 awakens out of reset into a predetermined initialization sequence controlled by an internal bootstrap ROM. An algorithm contained on this bootstrap ROM configures output compare port OC1 to a "low" state, effectively disabling any SCI transmittal from echoing back to the input port RXD of the microprocessor 13. The edge detect circuitry 106 is not utilized at all in the bootstrap mode. The SCI configuration of the microprocessor 13 in the bootstrap mode is compatible with the DRB II diagnostic communication tool 28.

Current US Cross Reference Classification (3):
701/32

Other Reference Publication (1):
SAE Technical Paper Series, No. 860389, "Chrysler Collision Detection (C.sup.2 D)-A Revolutionary Vehicle Network", Frederick O. R. Miesterfeld, Feb. 24-28, 1986.

Other Reference Publication (4):
SAE Standard J1850, Class B Data Communication Network Interface, Mar. 9, 1994.

Other Reference Publication (5):
ISO9141-2, International Standard, Road Vehicles--Diagnostic systems--Part 2; CARB requirements for interchange of digital information.

Other Reference Publication (8):
Resolution #93-40, State of California Air Resources Board, Amendments to Regulations Regarding On-Board Diagnostic System Requirements for 1994 and Later Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (OBD II).

Previous Doc Next Doc Go to Doc#

Hit List

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 7 of 7 returned.

☐ 1. Document ID: US 5957985 A

L5: Entry 1 of 7 File: USPT Sep 28, 1999

US-PAT-NO: 5957985
DOCUMENT-IDENTIFIER: US 5957985 A

TITLE: Fault-resilient automobile control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 2. Document ID: US 5941918 A

L5: Entry 2 of 7 File: USPT Aug 24, 1999

US-PAT-NO: 5941918
DOCUMENT-IDENTIFIER: US 5941918 A

TITLE: Automotive on-board monitoring system for catalytic converter evaluation

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 3. Document ID: US 5835871 A

L5: Entry 3 of 7 File: USPT Nov 10, 1998

US-PAT-NO: 5835871
DOCUMENT-IDENTIFIER: US 5835871 A

TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 4. Document ID: US 5729452 A

L5: Entry 4 of 7 File: USPT Mar 17, 1998

US-PAT-NO: 5729452
DOCUMENT-IDENTIFIER: US 5729452 A

TITLE: Method and system for diagnosing and reporting failure of a vehicle emission test

☐ 5. Document ID: US 5650930 A

L5: Entry 5 of 7 File: USPT Jul 22, 1997

US-PAT-NO: 5650930
DOCUMENT-IDENTIFIER: US 5650930 A

TITLE: Apparatus and method responsive to the on-board measuring of haulage parameters of a vehicle

☐ 6. Document ID: US 5528499 A

L5: Entry 6 of 7 File: USPT Jun 18, 1996

US-PAT-NO: 5528499
DOCUMENT-IDENTIFIER: US 5528499 A

TITLE: Apparatus and method responsive to the on-board measuring of haulage parameters of a vehicle

☐ 7. Document ID: US 5459660 A

L5: Entry 7 of 7 File: USPT Oct 17, 1995

US-PAT-NO: 5459660
DOCUMENT-IDENTIFIER: US 5459660 A

TITLE: Circuit and method for interfacing with vehicle computer

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L4 and sens$	7

Refine Search

Search Results -

Terms	Documents
L4 and sens$	7

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L5

Refine Search

Recall Text | Clear | Interrupt

Search History

DATE: Wednesday, March 16, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L5	l4 and sens$	7	L5
L4	L3 and obd$	7	L4
L3	L1 and 701/32,35,29.ccls.	70	L3
L2	L1 and 701/?.ccls.	17	L2
L1	(vehicle same diagnostic$) and @ad<=19980725 and (internet or web or www or online or network$)	557	L1

END OF SEARCH HISTORY

L5: Entry 7 of 7 File: USPT Oct 17, 1995

DOCUMENT-IDENTIFIER: US 5459660 A
TITLE: Circuit and method for interfacing with vehicle computer

Abstract Text (1):
An interface circuit for providing signals necessary to monitor one or more on-board vehicle computers through a serial communication link between an off-board controller and the on-board vehicle computer. The interface circuit is provided on the vehicle in order to provide the command signals to the off-board controller which will enable a standard monitoring device to read key information from the on-board vehicle computer. Additionally, the interface circuit also provides support of a second mode of operation that conforms to a proprietary communications protocol. The interface circuit automatically recognizes and adapts to the proper communication protocol for the tool sensed. The interface circuit complies with both a proprietary communication protocol and with an ISO 1941 format which satisfies an OBDII/CARB specification which all automobiles sold in the United States must comply with by the 1996 model year.

Application Filing Date (1):
19931222

Brief Summary Text (5):
One example of an appropriate vehicle bus structure is represented by the Chrysler Collision Detection ("C.sup.2 D") Serial Data Bus. This technology is described in the following publications and patents: SAE paper No. 860389, entitled "Chrysler Collision Detection (C.sup.2 D)--A Revolutionary Vehicle Network", by Frederick O. R. Miesterfeld, 1986; SAE paper No. 890529, entitled "The All-Adaptive Controls for the Chrysler Ultradrive Transaxle", 1989; U.S. Pat. No. 4,706,082, entitled "Serial Data Bus For Intermodule Data Communications," which issued on Nov. 10, 1987; and U.S. Pat. No. 4,719,458, entitled "Method of Data Arbitration and Collision Detection In A Data Bus," which issued on Jan. 12, 1988; and U.S. Pat. No. 4,739,323, entitled "Serial Data Bus For Serial Communication Interface (SCI), Serial Peripheral Interface (SPI) and Buffered SPI Modes of Operation," which issued on Apr. 19, 1988; and U.S. Pat. No. 4,739,324, entitled "Method for Serial Peripheral Interface (SPI) in a Serial Data Bus," which issued on Apr. 19, 1988; and U.S. Pat. No. 4,742,349 entitled "Method for Buffered Serial Peripheral Interface (SPI) in a Serial Data Bus", which issued on May 3, 1988. These co-assigned patents and the identified publications are all hereby incorporated by reference.

Brief Summary Text (6):
In this regard, it should be noted that the engine controller and the transmission controller discussed in the above referenced U.S. Pat. No. 4,875,391 are both connected to the C.sup.2 D Serial Data Bus. This Serial Data Bus may also be accessible to off-board vehicle computers through one or more diagnostic connectors on the vehicle. In this regard, it should be appreciated that any vehicle bus structure needs to be accessible to off-board computer systems in order to permit the bus itself to be tested and permit direct access to and communication with any of the vehicle computers tied to the vehicle bus. An example of the use of an off-

board diagnostic tool used to monitor and program an on-board vehicle computer is the Berra et. al. U.S. Pat. No. 5,278,759, issued on Jan. 11, 1994, and entitled "System and Method for Reprogramming a Vehicle Computer". This commonly assigned patent is hereby incorporated by reference.

Brief Summary Text (7):
In addition, one or more of these vehicle diagnostic connectors also typically provide separate communication links or channels with both the vehicle's engine control computer and the vehicle's transmission control computer. These separate communication links are generally designed to conduct serial communications directly with these particular on-board vehicle computers during certain diagnostic procedures.

Brief Summary Text (8):
In any event, diagnostic connectors have been employed since engine computers were first used on vehicles to permit communication between on-board and off-board computers. Thus, for example, data being gathered by the on-board vehicle computer from various sensors (such as engine speed and manifold pressure) may be transmitted to an off-board computer for programmed or operator analysis.

Brief Summary Text (9):
In response to the heavy reliance on on-board computers, combined with a variety of systems employed by the various automobile manufacturers, future vehicles sold in the United States will soon have to provide a standardized diagnostic interface. This restriction is referred to as the OBDII/CARB requirement and includes new vehicles beginning in 1994 model year and all vehicles in the 1996 model year. The OBDII/CARB requirement offers a choice between a J1850 specification and an ISO9141 specification. The OBDII requirement, the J1850 standard, and the ISO9141 are hereby incorporated by reference.

Brief Summary Text (10):
Accordingly, it is a principal objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool.

Brief Summary Text (11):
It is a more specific objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that is compatible with an existing proprietary communication system.

Brief Summary Text (12):
It is another objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that is additionally compatible with an ISO9141 specification which satisfies an OBDII/CARB requirement.

Brief Summary Text (13):
It is yet another objective of the present invention to provide an advanced system and method for interfacing an on-board vehicle computer with a hand held diagnostic tool that automatically recognizes and adapts to a proprietary communication system or an ISO9141 compatible system depending on which system is connected to the on-board vehicle computer.

Brief Summary Text (15):
To achieve the foregoing objectives, the present invention provides a system and method for providing signals necessary to monitor one or more on-board vehicle computers through a serial communication link between an off-board controller and the on-board vehicle computer. The interface circuit is provided on the vehicle in order to provide the command signals which will enable a standard monitoring device

to read key information from the on-board vehicle computer. The interface circuit complies with both a proprietary diagnostic tool and with an ISO9141 format which satisfies an OBDII/CARB specification to which all automobiles sold in the United States must comply with by the 1996 model year.

Brief Summary Text (16):
In one form of the present invention, the off-board controller is comprised of a diagnostic tool which includes a portable housing, a computer based control circuit contained in the housing and a plug-in memory module which is removably secured to the portable housing. The communication link between the diagnostic tool and the vehicle signal transfer structure is provided by a cable structure that includes an in-line adapter for providing the voltage level required for at least one of the command signals. The cable structure is removably connected to the diagnostic connector of the vehicle which provides access to the vehicle signal transfer structure.

Detailed Description Text (3):
A diagnostic connector 22 is connected to the engine controller 12 through the vehicle signal transfer structure 16. The diagnostic connector 22 includes electrical conduits which lead directly to the engine controller 12. In this regard, the cable 24 leading from the diagnostic connector 22 to the signal transfer structure 16 provides a bi-directional communication channel between the engine controller 12 and an off-board computer. FIG. 1 also shows a body diagnostic connector 26 which provides access to the C.sup.2 D bus of the vehicle signal transfer structure 16.

Detailed Description Text (5):
The DRB II diagnostic unit 28 includes a portable housing 36 which may be hand held near or in the vehicle 10 by a service technician. The front panel 38 of the DRB II unit includes a keypad 40 for entering data or instructions in an interactive communication process with the DRB II unit. In this regard, the DRB II unit includes a display 42 which is capable of visibly displaying several lines of character and numeric information. Thus, for example, the DRB II unit may prompt the service technician to enter particular information from the keypad 40 by producing a specific request on the display 42. A connector 312 is connected to a positive battery terminal J2 to supply voltage to the DRBII diagnostic tool 28 through the diagnostic connector 22.

Detailed Description Text (16):
The edge detect logic 106, in combination with the filtering logic 108, provides the necessary intelligence to enable the interface circuit 34 to sense either a proprietary DRB-II diagnostics tool or an ISO9141 compatible diagnostics tool and shift automatically into either SCI II mode or ISO9141 mode, depending upon the mode being utilized by the tool. The Z141 collage chip, illustrated in greater detail in FIG. 3, receives an input signal on line 318 through input port PC5. The input signal is passed to edge detect input circuitry 322 which buffers the input signal and senses a logic level change from either "high" to "low" or "low" to "high". The output signal from edge detect input circuitry 322 is then exclusive ORed at exclusive OR gate 324 with a signal output from an edge trigger control register 326 which enables the detection of the logic level transition of either a "rising" edge or "falling" edge. A status flag register 330, in cooperation with trigger control register 326 and decode logic circuitry 328, are used to detect a desired transition and then latch to the new state. The status flag register 330 confirms that a transition has taken place. Decode logic 328 enables the edge trigger control register 326 to be either read or written to and directs information onto bus 320.

Detailed Description Text (18):
When an ISO9141 test tool is connected, resistor 145 is supplied with approximately battery potential. This reference battery potential is divided by two by resisters

R256 and R285 and sent to the inverting input of the comparator section 121. The edge detect input port PC5 will sense a "low" signal from the comparator section 121. Based on these signals, the interface circuit 34 automatically recognizes an ISO9141 compatible diagnostic tool has been connected and shifts into the appropriate mode. The receive input port RXD continues to be in its initially disabled state caused by output compare port OC1. The diagnostic tool will send an identifier byte at 5 baud. If the microprocessor recognizes the identification based on the PC5 input sense of the collage, output compare port OC1 will be driven "high" and the receive bus path 114 will be enabled allowing data to pass to the microprocessor 13. From this point, output compare port OC1 will idle in a "high" state and ISO9141 messages will continue to be received by the microprocessor 13.

Detailed Description Text (19):
When the microprocessor 13 desires to transmit a message to the diagnostics test tool 28, the receive logic 122 filters out an echo created by the single-wire bi-directional configuration of the ISO9141 bus. This is accomplished by using output compare port OC1 to hold a "low" value for a period slightly longer than the length of the data transmission. Just prior to the SCI transmit, the output compare port OC1 toggles "low", disabling the receive bus path 114 from sensing the transmission. Shortly after the data transmission is complete, the output compare port OC1 toggles times out and "high", thereby re-enabling the receive bus path 114. This filtering process relieves the microprocessor 13 from clearing its internal receive register.

Detailed Description Text (20):
In the SCI II mode the initial reset status of the interface circuit 34 is identical to the reset status while in the ISO9141 mode of operation. The transmit output port TXD from the microprocessor 13 idles in a "high" state causing the transmit bus 116 to remain in a tri-state level. The output compare port OC1 idles in a "low" state to disable any messages from the transmit output port TXD from accessing the input port RXD of the microprocessor 13. The edge detect logic 106 will idle "high" when the interface circuit 34 is in the SCI II mode. The SCI II communication tool operates at a 5 V DC level which will not be sensed through the comparator circuitry 121, provided the battery voltage is above 10 volts DC.

Detailed Description Text (22):
The interface circuit 34 will also operate in a bootstrap mode, when necessary, to reprogram microprocessor 13 in a manner like that discussed in the referenced patent entitled "System and Method for Reprogramming a Vehicle Computer". In the bootstrap mode, the microprocessor 13 awakens out of reset into a predetermined initialization sequence controlled by an internal bootstrap ROM. An algorithm contained on this bootstrap ROM configures output compare port OC1 to a "low" state, effectively disabling any SCI transmittal from echoing back to the input port RXD of the microprocessor 13. The edge detect circuitry 106 is not utilized at all in the bootstrap mode. The SCI configuration of the microprocessor 13 in the bootstrap mode is compatible with the DRB II diagnostic communication tool 28.

Current US Cross Reference Classification (3):
701/32

Other Reference Publication (1):
SAE Technical Paper Series, No. 860389, "Chrysler Collision Detection (C.sup.2 D)-A Revolutionary Vehicle Network", Frederick O. R. Miesterfeld, Feb. 24-28, 1986.

Other Reference Publication (4):
SAE Standard J1850, Class B Data Communication Network Interface, Mar. 9, 1994.

Other Reference Publication (5):
ISO9141-2, International Standard, Road Vehicles--Diagnostic systems--Part 2; CARB requirements for interchange of digital information.

Other Reference Publication (8):
Resolution #93-40, State of California Air Resources Board, Amendments to Regulations Regarding On-Board Diagnostic System Requirements for 1994 and Later Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (OBD II).

Previous Doc Next Doc Go to Doc#

L5: Entry 7 of 7 File: USPT Oct 17, 1995

US-PAT-NO: 5459660
DOCUMENT-IDENTIFIER: US 5459660 A

TITLE: Circuit and method for interfacing with vehicle computer

DATE-ISSUED: October 17, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Berra; Charles J.	Troy	MI		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Chrysler Corporation	Highland Park	MI			02

APPL-NO: 08/ 172495 [PALM]
DATE FILED: December 22, 1993

INT-CL: [06] G01 M 15/00, G06 F 13/00

US-CL-ISSUED: 364/424.03; 364/431.12, 340/825.5, 73/117.3
US-CL-CURRENT: 701/33; 340/825.5, 701/115, 701/32, 73/117.3

FIELD-OF-SEARCH: 364/424.03, 364/431.01, 364/424.1, 364/551.01, 364/580, 364/550, 364/238.2, 364/239, 364/240.8, 364/222.2, 364/238.2, 364/240.8, 364/431.12, 340/825.5, 340/825.57, 340/853.2, 73/117.3, 73/118.1, 324/511

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	Re31582	May 1984	Hosaka et al.	364/431.04
☐	4207611	June 1980	Gordon	364/580
☐	4234921	November 1980	Kinoshita et al.	364/431.01
☐	4375672	March 1983	Kato et al.	364/431.04
☐	4602127	July 1986	Neely et al.	379/68
☐	4631666	December 1986	Harris et al.	364/200
	4694408	September 1987	Zaleski	384/551.01

☐				
☐	4706082	November 1987	Miesterfeld et al.	340/825.5
☐	4719458	January 1988	Miesterfeld et al.	340/825.5
☐	4739323	April 1988	Miesterfeld et al.	340/525.5
☐	4739324	April 1988	Miesterfeld et al.	340/825.5
☐	4742349	May 1988	Miesterfeld et al.	340/825.5
☐	4748843	June 1988	Schafer et al.	73/117.3
☐	4831560	May 1989	Zaleski	364/551.01
☐	4853850	August 1989	Krass, Jr. et al.	395/325
☐	4866616	September 1989	Takeuchi et al.	364/424.04
☐	4875391	October 1989	Leising et al.	477/155
☐	5107428	April 1992	Bethencourt et al.	384/424.04
☐	5172062	December 1992	Eisermann	304/503
☐	5214582	May 1993	Gray	364/424.03
☐	5265832	November 1993	Wesling et al.	246/169R
☐	5278759	January 1994	Berra et al.	364/424.01
☐	5318449	June 1994	Schoell et al.	364/431.04

OTHER PUBLICATIONS

SAE Technical Paper Series, No. 860389, "Chrysler Collision Detection (C.sup.2 D)-A Revolutionary Vehicle Network", Frederick O. R. Miesterfeld, Feb. 24-28, 1986.
Chrysler 1983-1988 Instruction Manual, entire book, System 2000 Diagnostics.
3-in-1 Instruction Manual, Monitor 4000E, Apr. 1990, entire book.
SAE Standard J1850, Class B Data Communication Network Interface, Mar. 9, 1994.
ISO9141-2, International Standard, Road Vehicles--Diagnostic systems--Part 2; CARB requirements for interchange of digital information.
890529, The All-Adaptive Controls for the Chrysler Ultra Drive Transaxle, Maurice B. Leising, Howard Benford and Gerald L. Holbrook, Chrysler Motors Corp. Mar. 21, 1994.
Environmental Protection Agency, Feb. 19, 1993, 40 CFR Part 86 Control of Air Pollution From New Motor Vehicles; Final Rule, Federal Register, vol. 58, No. 32, pp. 9468-9488.
Resolution #93-40, State of California Air Resources Board, Amendments to Regulations Regarding On-Board Diagnostic System Requirements for 1994 and Later Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (OBD II).

ART-UNIT: 234

PRIMARY-EXAMINER: Teska; Kevin J.

ASSISTANT-EXAMINER: Nguyen; Tan

ATTY-AGENT-FIRM: Calcaterra; Mark P.

ABSTRACT:

An interface circuit for providing signals necessary to monitor one or more on-board vehicle computers through a serial communication link between an off-board

controller and the on-board vehicle computer. The interface circuit is provided on the vehicle in order to provide the command signals to the off-board controller which will enable a standard monitoring device to read key information from the on-board vehicle computer. Additionally, the interface circuit also provides support of a second mode of operation that conforms to a proprietary communications protocol. The interface circuit automatically recognizes and adapts to the proper communication protocol for the tool sensed. The interface circuit complies with both a proprietary communication protocol and with an ISO 1941 format which satisfies an OBDII/CARB specification which all automobiles sold in the United States must comply with by the 1996 model year.

14 Claims, 3 Drawing figures

Previous Doc Next Doc Go to Doc#

Hit List

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 10 of 11 returned.

☐ 1. Document ID: US 6405111 B2

L8: Entry 1 of 11 File: USPT Jun 11, 2002

US-PAT-NO: 6405111
DOCUMENT-IDENTIFIER: US 6405111 B2

TITLE: System and method for distributed computer automotive service equipment

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 2. Document ID: US 6314422 B1

L8: Entry 2 of 11 File: USPT Nov 6, 2001

US-PAT-NO: 6314422
DOCUMENT-IDENTIFIER: US 6314422 B1

TITLE: Method for softlinking between documents in a vehicle diagnostic system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 3. Document ID: US 6285932 B1

L8: Entry 3 of 11 File: USPT Sep 4, 2001

US-PAT-NO: 6285932
DOCUMENT-IDENTIFIER: US 6285932 B1

TITLE: Computerized automotive service system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. De

☐ 4. Document ID: US 6009355 A

L8: Entry 4 of 11 File: USPT Dec 28, 1999

US-PAT-NO: 6009355
DOCUMENT-IDENTIFIER: US 6009355 A

TITLE: Multimedia information and control system for automobiles

☐ 5. Document ID: US 5916287 A

L8: Entry 5 of 11 File: USPT Jun 29, 1999

US-PAT-NO: 5916287
DOCUMENT-IDENTIFIER: US 5916287 A

TITLE: Modular automotive diagnostic, test and information system

☐ 6. Document ID: US 5895432 A

L8: Entry 6 of 11 File: USPT Apr 20, 1999

US-PAT-NO: 5895432
DOCUMENT-IDENTIFIER: US 5895432 A

TITLE: Method and apparatus for simultaneously coupling plural terminal devices through serial port and remote control apparatus incorporating same

☐ 7. Document ID: US 5884202 A

L8: Entry 7 of 11 File: USPT Mar 16, 1999

US-PAT-NO: 5884202
DOCUMENT-IDENTIFIER: US 5884202 A
**** See image for Certificate of Correction ****

TITLE: Modular wireless diagnostic test and information system

☐ 8. Document ID: US 5657224 A

L8: Entry 8 of 11 File: USPT Aug 12, 1997

US-PAT-NO: 5657224
DOCUMENT-IDENTIFIER: US 5657224 A

TITLE: Turf maintenance vehicle diagnostics and parameter condition logger

☐ 9. Document ID: US 5557268 A

L8: Entry 9 of 11 File: USPT Sep 17, 1996

US-PAT-NO: 5557268
DOCUMENT-IDENTIFIER: US 5557268 A

TITLE: Automatic vehicle recognition and customer automobile diagnostic system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 10. Document ID: US 4989146 A

L8: Entry 10 of 11 File: USPT Jan 29, 1991

US-PAT-NO: 4989146
DOCUMENT-IDENTIFIER: US 4989146 A

TITLE: Automotive trouble diagnosing system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L7 and (remote$ with diagnos$)	11

Display Format: TI Change Format

Previous Page Next Page Go to Doc#

L8: Entry 1 of 11 File: USPT Jun 11, 2002

US-PAT-NO: 6405111
DOCUMENT-IDENTIFIER: US 6405111 B2

TITLE: System and method for distributed computer automotive service equipment

DATE-ISSUED: June 11, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rogers; Steven W	Conway	AR		
Gill; George M.	Vilonia	AR		
de Belleuille; Jean	Brunswick	ME		
Kling, III; Michael J.	Little Rock	AR		
Baird; Michael L.	Los Altos	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Snap-On Technologies, Inc.	Lincolnshire	IL			02

APPL-NO: 08/ 962023 [PALM]
DATE FILED: October 31, 1997

PARENT-CASE:
RELATED APPLICATIONS This application is a continuation-in-part of copending application Ser. No. 08/857,725 filed on May 16, 1997, assigned to the assignee herein, and is related to an application entitled, "Computerized Automotive Service System," filed Oct. 31, 1997, Ser. No. 08/961,618, also assigned to the assignee herein, both of which are hereby incorporated by reference.

INT-CL: [07] G06 F 19/00

US-CL-ISSUED: 701/33; 701/29, 709/200
US-CL-CURRENT: 701/33; 701/29, 709/200

FIELD-OF-SEARCH: 701/29, 701/33, 701/35, 395/683, 395/200.49, 395/200.47, 356/152, 705/27, 705/26, 709/200, 706/11, 707/10, 707/103, 707/102, 707/104, 707/513

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL

☐	4381548	April 1983	Grossman et al.	364/551
☐	4404639	September 1983	McGuire et al.	701/35
☐	5208646	May 1993	Rogers et al.	356/152
☐	5506772	April 1996	Kubozono et al.	701/29
☐	5602733	February 1997	Rogers et al.	701/29
☐	5713075	January 1998	Threadgill et al.	455/427
☐	5732074	March 1998	Spaur et al.	370/313
☐	5758300	May 1998	Abe	701/33
☐	5913878	August 1999	Chapin, Jr.	701/30
☐	6052711	April 2000	Gish	709/203

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO 97/26750	July 1997	WO	

OTHER PUBLICATIONS

Pallatto, "A Hypertext System Means Hyperservice at Ford Motor", PC Week, Oct. 1988, pp. 51 and 58.*

Hokimoto et al., "An Approach for Constructing Mobile Applications Using Service Proxies", IEEE May 1996, pp. 726-733.*

Microsoft Publication, DCOM Technical Overview, Nov. 1996.*

Hunter Engineering Company Product Borchure, Form No. 3580T "Hunter/CAS For Hunter Seriess 211 Compterized Wheel Alignment Systems", Nov. 1993.*

Microsoft Publication "What is ActiveX", Jul. 1996.*

Bob, "Java: The Future of Client Server", Dec. 1995.*

Williams, Al, Developing Active Web Controls, Chapters 1 and 6-9. Coriolis Group Books, 1996.

Hipson, Peter D., "Installing Your Applications Under Windows 95," Proceedings of the International Developers Conference For Windows, Book III, Chapter F1; Jun. 16, 1995.

Beveridge et al., Multithreading Applications in Win32: The Complete Guide To Threads, Chapters 1, 10, and 14; Dec. 1996.

Punders, Mark, Installshield5: Getting Started Guide. Installshield Software Corporation, 1997.

Norton, Daniel A., Writing Windows Device Drivers, Chapters 1 and 7-10; 1992.

Help-To-HTML Converter: User's Guide. Blue Sky Software Corporation, 1996.

Hall, Dr. Bill, "Win32 Internationalization" and Hall et al., "Working with Japanese and Other Far East Languages," Proceedings of the International Developers Confedrence For Windows, Book I, Chapter M3; Jun. 12, 1995.

Oney, Walter, "Why Port to Win32?"; Freytag, Ausmus, "How to Implement a Multilingual User Interface"; Richter, Jeffrey, "Processes and Threads"; and Freytag, Ausmus, "Setting Up an International Software Project," Proceedings of the International Developers Conference For Windows, Book II, Chapters T1, T18, and W6, respectively; Jun. 13-14, 1995.

Rumbaugh et al., Object-Oriented Modeling and Design, Chapters 13-17. Prentice Hall, 1991.

Kano, Nadine, Developing International Software for Windows95 and Windows NT: A Handbook for International Software Design, Chapters 1-4. Microsoft Press, 1995.

Blaszczak, Mike, The Revolutionary Guide to Win32 Programming Using Visual C++,

Chapters, 3, 4, 7 and 9; 1995.

ART-UNIT: 3661

PRIMARY-EXAMINER: Nguyen; Tan

ATTY-AGENT-FIRM: McDermott, Will & Emery

ABSTRACT:

A computerized automotive service equipment system is adapted to access remotely located computer systems to retrieve or exchange data and/or software applications, or to undergo live or real-time and two-way interaction. The system and its components are dynamic with respect to both function and data, and can be easily updated or otherwise altered. The system of the present invention utilizes World Wide Web technology, which enables the use of universal and widely compatible programming tools and techniques for efficient and fast system development.

33 Claims, 6 Drawing figures

Previous Doc Next Doc Go to Doc#

L8: Entry 10 of 11 File: USPT Jan 29, 1991

US-PAT-NO: 4989146
DOCUMENT-IDENTIFIER: US 4989146 A

TITLE: Automotive trouble diagnosing system

DATE-ISSUED: January 29, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Imajo; Minori	Yokohama			JP

US-CL-CURRENT: 701/35; 340/635, 702/183, 702/188

ABSTRACT:

An automotive vehicle is equipped with an on-board microcomputer having a function of pre-diagnosing and indicating a possibility of arising of an automotive trouble in response to electrical informations relatable to the trouble which informations are stored in a memory device. Additionally, an acoustical coupler is mounted on the vehicle and electrically connected to the memory device to convert the electrical informations to acoustic signals. The thus converted acoustical signals are to be transmitted via a telephone line to a computer for automotive trouble diagnosis purpose which computer is located remote from the vehicle, for example, in the head office of a service firm, thereby making it possible to achieve automotive trouble diagnosis without carrying the memory device to a service factory.

16 Claims, 11 Drawing figures
Exemplary Claim Number: 5
Number of Drawing Sheets: 9

Generate Collection Print

L8: Entry 11 of 11 File: USPT Mar 24, 1981

US-PAT-NO: 4258421
DOCUMENT-IDENTIFIER: US 4258421 A

TITLE: Vehicle monitoring and recording system

DATE-ISSUED: March 24, 1981

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Juhasz; John E.	Lake Orion	MI		
Williams; Hansel O.	Troy	MI		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Rockwell International Corporation	Pittsburgh	PA			02

APPL-NO: 06/ 020622 [PALM]
DATE FILED: March 14, 1979

PARENT-CASE:
CROSS REFERENCE TO RELATED APPLICATION This application is a continuation-in-part of Ser. No. 881,221, filed Feb. 27, 1978, now abandoned.

INT-CL: [] G06F 13/00, G08B 23/00

US-CL-ISSUED: 364/424; 364/442, 340/52F, 340/870.16
US-CL-CURRENT: 701/35; 340/870.16, 701/123

FIELD-OF-SEARCH: 364/424, 364/425, 364/431, 364/200, 364/900, 364/442, 340/27R, 340/52R, 340/52F, 340/53, 340/21R, 73/116, 73/117.2, 73/117.3, 235/92TC, 235/61S, 235/61T, 235/61V, 360/6

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	2392467	February 1974	Engel et al.	346/33R
☐	3099817	July 1963	Kendall	346/81
☐	3188647	June 1965	Davis	346/60

☐	3388404	June 1968	Bush	346/24
☐	3702989	November 1972	Provenzano, Jr. et al.	364/200
☐	3792445	February 1974	Bucks et al.	360/6
☐	3866166	February 1975	Kerscher et al.	340/52F
☐	3878371	April 1975	Burke	235/92PD
☐	3889461	June 1975	Marti et al.	58/25
☐	4009375	February 1977	White et al.	364/424
☐	4013875	March 1977	McGlynn	364/424
☐	4027289	May 1977	Toman	340/27R
☐	4041470	August 1977	Slane et al.	364/424
☐	4050295	September 1977	Harvey	73/114
☐	4054947	October 1977	Shanks et al.	364/900
☐	4067061	January 1978	Juhasz	364/424
☐	4072850	February 1978	McGlynn	364/424
☐	4188618	February 1980	Weisbart	364/424

ART-UNIT: 236

PRIMARY-EXAMINER: Atkinson; Charles E.

ASSISTANT-EXAMINER: Chin; Gary

ABSTRACT:

A device monitoring and recording system is described which is particularly applicable to on-board vehicle monitoring and recording of operating engine parameters. The system comprises a plurality of sensors for sensing operating parameters of the engine and for generating data signals in response thereto, a data processing unit for receiving the data signals and a portable data link for extracting the processed data. Means are also provided for analyzing the processed data in remote computing means to provide printouts for record keeping, maintenance and diagnostic purposes.

13 Claims, 7 Drawing figures

Previous Doc Next Doc Go to Doc#

L8: Entry 1 of 11 File: USPT Jun 11, 2002

DOCUMENT-IDENTIFIER: US 6405111 B2
TITLE: System and method for distributed computer automotive service equipment

Abstract Text (1):
A computerized automotive service equipment system is adapted to access remotely located computer systems to retrieve or exchange data and/or software applications, or to undergo live or real-time and two-way interaction. The system and its components are dynamic with respect to both function and data, and can be easily updated or otherwise altered. The system of the present invention utilizes World Wide Web technology, which enables the use of universal and widely compatible programming tools and techniques for efficient and fast system development.

Application Filing Date (1):
19971031

Brief Summary Text (2):
The present invention relates to a system and method for distributed computer automotive service equipment. More specifically, the present invention relates to computerized automotive service equipment wherein different diagnostic or service components communicate with one another over a computer network, such as the Internet. The present invention also relates to a novel computerized automotive service system which utilizes object oriented programming and ISO Standard 8879 communications protocol to decentralize and modularize the software routines that perform the computational, user interface, and other necessary algorithms

Brief Summary Text (7):
It has been known to design automotive service equipment that sends data through a local area network to a file server, such as a Novell server platform. This, however, limits the information to being stored as files and does not support real-time data flow or a distributed application. An example of such as system is disclosed in U.S. Pat. No. 4,404,639, dated Sep. 13, 1983. The data retained in such files could only be downloaded and stored on self-contained proprietary platforms. These data-only files, then, did not give the resulting automotive service equipment system the capability of exporting data to a remote location for processing, and then returning the processed data to the original location. They also did not give the resulting system the capability to locate different portions of a single automotive service equipment application on different computers.

Brief Summary Text (8):
The prior art automotive service equipment system computers also did not communicate with any remote offsite computer to submit in real-time the data gathered by the sensors in the course of effecting a service procedure. Hence, it was not possible for sensors to transmit their data in real-time to a remote site for analysis and inspection at that remote site. For instance, in vehicle wheel alignment applications, the wheel alignment sensors that were mounted on the vehicle wheels were capable of transmitting wheel angle data only to the vehicle wheel alignment machine itself. There was no way for an offsite technician and/or an offsite computer to review the data to evaluate whether the alignment angles were within specification. Likewise, there was no way for an onsite technician to present this real-time angle information to an off-site expert for purposes of

either troubleshooting problems with the servicing equipment, or for receiving instructions and advice on how to proceed with an alignment procedure.

Brief Summary Text (11):
Two major developments in the computer arts have heretofore not been applied in the field of automotive service equipment. The first of these is Internet-based technologies. The second is object oriented programming. Both will be discussed below in detail to lay the groundwork for the subsequent detailed description of the present invention.

Brief Summary Text (12):
Internet-Based Technologies

Brief Summary Text (13):
Until now, no known automotive service equipment utilized the data transfer capabilities of the Internet. The World Wide Web is one type of network residing on the Internet. It began as an information networking project at the European Laboratory for Particle Physics (CERN). The World Wide Web is best described as the specific software, protocols, conventions and information that enable hypertext and multimedia publishing of resources on different computers around the world. The popularity of the Internet has provided the computer software industry with many new software applications, yet these by and large have been restricted to home and entertainment use.

Brief Summary Text (14):
Web Browsers

Brief Summary Text (15):
Most commonly, home and entertainment users of the Internet access the Internet through the use of a World Wide Web browser. This Web browser application can easily and seamlessly display text and graphics sent from practically any type of computer system. The information to be displayed is sent to the Web browser on Web "pages." Web pages are constructed using the syntax and rules defined in the ISO 8879 Standard General Markup Language (SGML) document available from the W3 Consortium, a group of companies and individuals dedicated to the use and standardization of certain data transmission protocols. This ISO standard is sometimes known as hypertext markup language (HTML), version 3.2, although it has evolved that HTML is both slightly overinclusive and underinclusive of the actual ISO 8879 standard. HTML is a markup language used to create hypertext documents that are not unique to one platform or another. HTML files are ASCII text files with codes embedded (indicated by markup tags) to indicate formatting and hypertext links.

Brief Summary Text (16):
Web Servers

Brief Summary Text (17):
Computer systems that send information to a Web browser are called Web servers. A Web server stores Web pages (constructed and stored as static files) and serves them out to the Web browser on demand. In their simplest form, server Web pages that are constructed only with HTML, without more, cannot be changed by a Web browser user, and are thus not interactive.

Brief Summary Text (18):
Web Communication Protocols

Brief Summary Text (19):
Those of skill in the art will appreciate that the Web utilizes a number of communication protocols to transmit and receive addressable data. HTTP is an application-level protocol for distributed, collaborative, hypermedia information

systems. It is a generic, stateless, object-oriented protocol. Web servers are computers equipped with the server software to respond to HTTP requests, such as requests from a Web browser. HTTP has generally subsumed most of the functions of the older File Transfer Protocol (FTP). FTP, in turn, is a protocol that requires a logon to a remote computer to browse directories and effect a two-way file transfer. A feature of the newer HTTP, which again has largely replaced FTP, is the typing and negotiation of data representation, allowing systems to be built independently of the data being transferred.

Brief Summary Text (20):
A Web server uses this HTTP protocol to communicate with clients on a TCP/IP network. TCP/IP is a lower level protocol that communicates with a network card driver. The network card driver in turn communicates directly with the network hardware or physical layer of the protocol stack. TCP/IP provides the source and destination address of the data. More specifically, TCP/IP is defined as a set of networking protocols that provides communications across interconnected networks of unlike computers. TCP/IP includes standards and conventions for routing data traffic. When a user at a browser submits a new request to access a Web page, one of the first things the browser does is to locate the TCP/IP address for that particular page. In principle, any computer having a TCP/IP address and properly connected to the Internet can be accessed on the Web.

Brief Summary Text (21):
By using a single Web browser application to access different Web "sites," or Web Servers, around the world, a user can see, hear and interact with many different informational systems. A user can experience information in different languages and presentation styles. A user can view pictures, movies, music, live telephone or video teleconferences, search databases, download software, control and view robotic video cameras, participate in group discussions, and send or receive email. A special new browser, called a thin client, can also run computer software that actually resides on another computer across the world. Such thin clients make it possible to lease software or run software that would not normally work on a particular type of computer, i.e., Windows programs on a Unix system. An example of a thin client is the Winframe Web Client by Citrix Systems, Inc., Coral Springs, Fla.

Brief Summary Text (23):
At the Web server, oftentimes an application exists that receives data inputs from a Web browser, and then uses those inputs to dynamically assemble a particular output in return. The Web browser then displays the output to the browser operator. These applications are generally referred to as common gateway interfaces (CGI). A CGI script file is a program that executes on the Web server. A database search engine is a good example of a CGI script, as is a Web page counter that indicates the number of "hits," or visitors, to a Web page within a certain period. The user at the Browser is first presented with a form inquiring what type of information is to be extracted from the database. Once the user fills out the form and submits it by sending it back to the Web server, the CGI script is executed. The CGI uses the information from the form to compose a query to the database. The CGI script then formats the information retrieved from the database query and sends it back to the Web browser for display. A CGI script is limited, since it is basically a standalone program that executes outside the Web server. CGI scripts cannot access user information available from within the Web server, as they can usually only take an input directly from the form submitted by the user at the browser.

Brief Summary Text (24):
Other programs reside on the browser alone, or the browser and server both, to add to the functionality of the browser by making it dynamic and interactive with the Web server. Two examples are Java and ActiveX.

Brief Summary Text (26):

Java, developed by Sun Microsystems, is a browser language that allows small programs or applications, called "applets," to run within the browser. Java script is sent from the Web server as byte codes. The Java byte codes are not HTML but are embedded within HTML. The Web browser contains a program called a Java Virtual Machine that converts the byte codes to computer instructions that are subsequently executed. Java is therefore computer type independent, and a Java applet will work on any Web browser supporting the Java Virtual Machine. Java is good for animated displays and moving or scrolling text messages, but is limited to only the functions provided by the Web browser. A Java applet cannot access functions outside the Web browser.

Brief Summary Text (28):
The Component Object Model (COM) is a software object model that has a standardized interface. COM objects can communicate with other COM objects over distributed computers via protocols such as DCOM, a Microsoft standard. The protocol is indifferent to the particular transmission medium used, i.e., LAN, Intranet, Internet, serial connection, et cetera.

Brief Summary Text (29):
ActiveX Technology, developed by Microsoft Corporation, is an implementation of a component object model. ActiveX is similar to CGI scripts and Java applets. ActiveX enables interactive and fully functional programs based on Web browser technology. ActiveX is made up of several components: ActiveX server extensions, server filters, Active server pages and ActiveX controls (formerly, OLE controls). ActiveX server extensions are similar to CGI scripts but actually execute as extensions of the Web server. Extensions have access to useful information, within the Web server, about the Web browser users and the Web server host system. ActiveX controls are analogous to Java applets. Examples include buttons, stock tickers and chart controls. But unlike Java script, ActiveX controls are not byte codes but actual small computer programs, or software objects, that do not require a subsystem such as the Java Virtual Machine. Active X controls are not computer type independent and must be written exclusively for a target computer type, e.g., a Windows-based system. Once installed into the Web browser, an ActiveX control is not limited to only the functions provided by the Web browser. Active X controls have the power to perform any function that any typical computer application can perform because they are stand alone software objects. For instance, they may be a stand alone word processor, spread sheet, etc. ActiveX controls also have the built-in capacity to share data with other Active X controls or extensions on the same computer or one on a remote computer system. Other ActiveX technologies such as ActiveX server pages and ActiveX server filters provide a comprehensive development system for Internet and Web browser based systems.

Brief Summary Text (31):
In sum, HTTP is the basic underlying protocol for HTML, CGI script, Java applets and ActiveX controls. FIGS. 1-3 show the three basic Web server and Web browser configurations. FIG. 1 shows an inactive model of a typical HTML-only based environment. Web server 10 provides HTML based Web pages to Web browser 20, the HTTP client. No animation or browser controlled output is possible because neither CGI scripts, Java nor ActiveX is implemented.

Brief Summary Text (32):
FIG. 2 represents the active server model, and shows enhancements to the basic model of FIG. 1. In this model, Web server 30 is an active server, providing dynamic information on Web pages, HTML-based database access, and CGI-style programs. Web browser 40, the HTTP client, continues to be inactive and only display what is sent by the Active server, but now the Active server model offers programmable extensions to the server software that are similar to CGI scripts. These extensions execute in the same address space as the server software, and have access to all the server system resources, providing much faster response time than CGI programs.

Brief Summary Text (33):
FIG. 3 represents the next evolution, the ActiveX model. It shows additional communication between the Web server 50 and the Web browser 60 other than just HTML. In this model, ActiveX controls on the Web browser 60 communicate directly with ActiveX controls on the Web server 50. ActiveX controls are software objects or somewhat self-contained programs that can be contained within other programs called container objects 55. Internet Explorer 4.0 (a Web browser), Microsoft Office Binder and the present Windows shell are all examples of ActiveX container objects 55.

Brief Summary Text (34):
One example of an ActiveX control for the Web browser is Microsoft's ActiveMovie Control. ActiveMovie Player is an ActiveX control that can view files that contain both audio and image information. The key advantage is that you can produce streaming multimedia content that the user can immediately enjoy, rather than waiting for a multimedia file to be first downloaded. ActiveX technology provides for on the fly Web browser updating. If the Web browser does not initially support ActiveMovie, for example, the Web server will update the Web browser by sending the ActiveMovie component via HTTP. The Web browser will transparently install ActiveMovie and retain it for future use. The ActiveMovie component executes as part of the Web browser and extends its capabilities to play real-time sounds and images. While playing a movie, the communication is no longer HTML, but direct communications between the ActiveMovie ActiveX control on the Web server and the ActiveMovie ActiveX control on the Web browser. Hence, ActiveX controls are not limited to Web pages. They may be used as software objects within a standard non-networking application. Such reusability allows a program to be constructed as a stand alone non-networking application and then easily extended to share information with remote computer systems.

Brief Summary Text (36):
The second computer development that is not known to have been applied in the field of automotive service equipment is object oriented programming and object oriented design (OOP/OOD). OOP involves the creation of software "objects." The foregoing description of Internet technologies referred to such objects, because current Web browser/server technology relies heavily on them. More generally, however, software objects may be thought of as self-contained mini-programs within a program. Before OOP, programs primarily consisted of two basic elements, data and program instructions. Data elements are storage locations. Program instructions are commands the computer will follow to make decisions or manipulate data. A data element such as a variable, constant or structure had only one function--to hold information. Instructions had only one function--to perform some action. With the advent of software objects, the line between data and instructions becomes fuzzy. Objects are software entities that have properties. They can take action, like instructions, but also utilize data. One of the main virtues of software objects is their inherent reusability. Objects, being largely self-contained, may be purchased that perform many commonplace functions, such as database routines, mathematical algorithms, and input/output functions. Many objects are included with the Microsoft Visual C/C++ 4.2 Developers Studio, an integrated software development environment for writing object oriented programs.

Brief Summary Text (40):
Until now, it has not been appreciated to apply Internet based technologies or object oriented programming to automotive service equipment systems. It is therefore an object of the present invention to overcome the disadvantages and limitations of prior art automotive service equipment systems and to apply such technologies.

Brief Summary Text (41):
It is also an object of the invention to apply Internet based technologies and

object oriented programming techniques to automotive service equipment systems.

Brief Summary Text (42):
It is another object of the invention to apply Internet based technologies and object oriented programming techniques to computerized vehicle wheel alignment systems.

Brief Summary Text (45):
It is still yet another object of the invention to provide an automotive service equipment application wherein updated vehicle operating specifications may be accessed over the Internet and conveniently applied by the automotive service software application.

Brief Summary Text (46):
It is another object of the invention to utilize the ISO 8879 language standard to create a networked automotive service equipment system.

Brief Summary Text (51):
The present invention is directed to a number of embodiments that share novel features. In general, the present invention is directed to a computerized automotive service equipment system adapted to access remotely located computer systems to retrieve or exchange data and/or software applications, or to undergo live or real-time and two-way interaction. The system and its components are dynamic with respect to both function and data, and can be easily updated or otherwise altered. The system of the present invention utilizes World Wide Web technology, which enables the use of universal and widely compatible programming tools and techniques for efficient and fast system development.

Drawing Description Text (2):
FIGS. 1-3 show block diagram overviews of present categories of Internet browser/server configurations.

Detailed Description Text (3):
FIG. 4 shows a block diagram of the automotive service equipment system of the present invention. The system of FIG. 4 is used to conduct a diagnostic analysis of vehicle components, such as the engine, brakes, suspension or alignment. While FIG. 4 shows the invention in its general form, the description herein will occasionally describe the invention in its form as a vehicle wheel aligner, such as that disclosed in U.S. Pat. Nos. 4,383,370 or 5,208,646.

Detailed Description Text (4):
Data input controller 200 is a computer, which in the preferred embodiment contains a microprocessor and a memory coupled thereto (not shown). Controller 200 comprises a general purpose portable computer (PC), such as an Intel Pentium-based IBM compatible computer, although any hardware platform suitably programmed will work just as well. Data input controller 200 receives data input from a measurement device 210. In a wheel alignment application, measurement device 210 may be one or more wheel mounted alignment angle sensors. Measurement device 210 is adapted to transmit signals representative of a vehicle diagnostic state to data input controller 200. Such information can be transmitted via a hard wired cable and a serial connection, via infrared transmission and a serial connection, via radio frequency transmission and a serial connection, or any other known means. In the vehicle wheel aligner example, such information can be transmitted via cables directly linking each alignment sensor head to the wheel alignment controller 200.

Detailed Description Text (5):
Data input controller 200 is adapted to receive the input from measurement device 210 and to create an output perceptible by an operator at an output device 230. Output device 230 will usually be a CRT coupled to the data input controller 200 through appropriate video driver means as is known in the art. Nonetheless, the

output device might also include an audio output, such as a series of coded tones signifying various vehicle diagnostic states, or even voice guided alignment, as disclosed in copending application Ser. No. 08/920,029, assigned to the present assignee herein, and incorporated by reference. In the preferred vehicle wheel aligner embodiment, the output device 230 comprises a CRT that contains a graphic display of a vehicle diagnostic state, for instance real-time readings for wheel alignment angles, such as toe, camber, caster, SAI, et cetera. Juxtaposed with the graphic real-time readings are graphic representations of vehicle wheel alignment specification values, such that an operator of the vehicle wheel alignment system is easily capable of comparing present real-time readings with the desired specification values and in response making appropriate servicing adjustments.

Detailed Description Text (6):
While data input controller 200 accepts data from measurement device 210, and places vehicle diagnostic information on output device 230, controller 200 does not necessarily comprise all of the computer software necessary to perform the vehicle diagnostic computations. Therefore, networked controller 220 is provided. Networked controller 220 itself comprises a computer having a microprocessor and a memory. At least some of the computer software necessary for controller 200 to create a suitable output at output device 230 resides in the memory of networked controller 220. Between data input controller 200 and networked controller 220 is provided a suitable computer network. The suitable computer network makes it possible to place networked controller 220 at a location remote from data input controller 200. However, it is not necessary for networked controller 220 to be remote. Controllers 200 and 220 may be located as close as the same room, as long as the proper connections and protocols are observed.

Detailed Description Text (7):
The network connection between data input controller 200 and networked controller 220 generally comprises the HTTP network protocol, or any protocol substantially similar. Since HTTP, or its substantial equivalent, is used, controller 200 may communicate with controller 220 via hypertext markup language (HTML). In this regard, data input controller 200 is similar to a Web browser, and networked controller 220 is similar to a Web server. In a preferred embodiment, networked controller 220 comprises a Web server having ActiveX server technologies. Similarly, data input controller 200 comprises a Web browser having ActiveX controls.

Detailed Description Text (8):
The system can be implemented via an Internet connection or any suitable local area network connection. One of skill will appreciate that, when networked to each other, controller 200 and controller 220 each have unique network addresses. The unique network addresses for controller 200 and controller 220 may comprise TCP/IP addresses. Indeed, data input controller 200 is capable of accessing multiple networked controllers that, like controller 220, are each addressable and utilize the HTTP protocol. Each different network controller is capable of providing functionality for a different item of automotive service equipment. One networked controller may comprise ActiveX functionality for a vehicle wheel alignment system, while another networked controller may comprise ActiveX functionality for an engine analyzer. In any event, data input controller 200 may access either or both of them, and measurement device 210 will then be interchanged appropriately to supply the proper sensor equipment for the particular task at hand. For instance, when networked controller 220 comprises the ActiveX technologies sufficient to provide wheel alignment functionality to data input controller 200, measurement device 210 comprises wheel alignment sensor heads. When networked controller 220 comprises the ActiveX technologies sufficient to provide engine analyzer functionality to data input controller 200, measurement device 210 comprises engine analysis test probes. In light of the foregoing, data input controller 200 may host more than one integrated system of automotive service equipment.

Detailed Description Text (9):
In operation, the microprocessor (not shown) of data input controller 200 executes an application residing in controller 200 memory that allows it to access the memory of the networked controller 220 through the controller 220 microprocessor. In one embodiment, data input controller 200 accesses the memory and microprocessor in networked controller 220 to access a software object representative of vehicle diagnostic specifications, such as vehicle wheel alignment specifications. In this case, once data input controller 200 retrieves such information, data input controller 200 can use software routines that reside in its own memory to convert the signals that represent the vehicle diagnostic state into an output at the output device for the operator to review. This is one example of distributed computing using software objects.

Detailed Description Text (10):
In operation in another embodiment, data input controller 200 accesses the memory and microprocessor in networked controller 220 to access a software object representative of both vehicle diagnostic specifications and the diagnostic algorithm itself. In this embodiment, the signals that represent the vehicle diagnostic state are passed to the networked controller 220 memory. There, the networked controller 220 microprocessor performs the algorithms necessary to convert the raw data signals originating in measurement device 210 into processed signals. The processed signals are indicative of the result of a vehicle diagnostic computation. The processed signals are then returned over the network to data input controller 200 memory, where the processed signals are directly used to form the output that will appear at output device 230. This is another example of distributed programming.

Detailed Description Text (11):
FIG. 5 is a schematic block diagram showing a further embodiment of the system of the present invention. Here, data input controller 200 and output device 230 have been partly combined into the functionality represented by browser 100, consistent with what was just described. Network controller 220 has been partly combined into the functionality represented by server 110, consistent with what was just described. Similarly, wheel alignment sensors 130,132, 134 and 136 are species of measurement device 210. However, unlike the embodiment shown in FIG. 4, in this embodiment sensors 130, 132, 134 and 136 are coupled to server 110 through appropriate network connections. This is in contrast to the equivalent structure in FIG. 4 being coupled to the data input controller.

Detailed Description Text (12):
In the embodiment of FIG. 5, server 110 is an active server, preferably one with DCOM technologies, preferably ActiveX technologies. Server 110 has an area, or set of pages, dedicated to general customer data, vehicle type and vehicle diagnostic information. Another area is dedicated specifically to alignment procedures. In operation, browser 100 hosts ActiveX controls for functions requiring interaction or dynamic content, such as alignment meters for graphical display to an operator. Browser 100 also preferably hosts a Java Virtual Machine that is adapted to accept Java byte codes from server 110, and thereby provide computer animation on the browser 100 display using Java applets. These applets might comprise operator instructional information, and similar help files. Preferably, the sensors 130, 132, 134 and 136 communicate on a TCP/IP based shop network (Intranet) or are directly connected to the server 110 through a standard dedicated interface such as a serial communication port. Data from the alignment sensors is transmitted to server 110 via direct communication between ActiveX controls on the server and in the sensor subsystems. The ActiveX controls in server 110 processes the data through alignment algorithms that send the processed data to the ActiveX meters in browser 100 for display. It will be appreciated that the ActiveX controls are software objects constructed with OOP techniques and can be designed for reuse in other applications.

Detailed Description Text (13):
The system of FIG. 5 also supports a remote browser or server 120. Remote browser or server 120 is addressed over the Internet and has its own Internet TCP/IP address. Server 110 preferably comprises a modem to allow remote connection to remote browser or server 120 over a telephone line, for instance via a standard Internet service provider (ISP) connection. In this way, a Web browser or server 120 anywhere in the world can access the aligner system of FIG. 5. Remote browser or server 120 can even take the place of the functionality provided by onsite browser 100. In other words, the alignment readings can be displayed on meters from within the remote Web browser or server 120. All of the foregoing connections, in the preferred embodiment, are carried out using the HTTP transmission protocol. In addition, while server 110 and remote browser or server 120 have been described as carrying ActiveX technologies, it is easily apparent to those of skill in the art that the systems can be modified to incorporate a thin client, CGI and/or Java to perform the various network and data intensive tasks. It is equally apparent that any time a browser function is recited above, the same end result can be accomplished using a thin client instead.

Detailed Description Text (14):
FIG. 6 is a schematic block diagram representation of another embodiment of the present invention. Notably, the system of FIG. 6 allows up to the minute retrieval of information in an automotive service equipment system. This up to the minute information can include vehicle diagnostic specifications, such as vehicle wheel alignment specifications for new models, and corrected values for old models when errors in an existing database are corrected. In addition to up to the minute information retrieval, the system of FIG. 6 enables remote billing options that heretofore were not possible. Wheel alignment, engine analysis, brake testing, wheel balancing and the like can all be performed in a shop environment on a "pay-per-use" basis, wherein a remote server permits the use of vehicle diagnostic software, and keeps account of the number of times such software is used by a particular shop.

Detailed Description Text (15):
Service equipment 190, i.e. all computer based components within a garage or service bay that use or generate information, is connected as an HTTP network at the local shop. For instance, the service equipment 190 may include a shop management system 192 that keeps track of jobs, scheduling and customer information; an alignment system 194; an engine diagnostic system 196 and a show room kiosk 198 that enables car owners to access current data about their car, such as to view the alignment procedure as it occurs in the service bay itself. The enumeration of these types of service equipment is not to be construed as limiting but rather exemplary, as there are many dozens of types of service equipment in use in a typical garage that might be incorporated into the shopwide network. Each individual item of service equipment 190 carries a unique TCP/IP address and is located on the local shop HTTP network, along with a local shop server 170, which acts as a gateway to the outside world. Server 170 also acts as the common repository of information.

Detailed Description Text (16):
Utilizing a modem on the local server 170, the network can be attached to the Internet via an ISP. It is then possible to retrieve information from a number of sources such as an equipment provider, automotive manufacturer or the home office of a chain of garages. Information need not be restricted to automotive information. The network also supports accessing such business information as inventory levels at sister stores, transmission of email to customers, or remote diagnosis of shop floor equipment by automotive service equipment manufacturers. For example, in FIG. 6, server 150 is an automotive service equipment manufacturer server that can diagnose equipment problems in alignment system 194; server 160 is a server for an OEM automobile manufacturer server that can provide new or updated vehicle servicing specifications; server 180 is a service station owner/parent

company server that can retrieve and supply business information, such as inventory, delivery, service quota and other information.

Detailed Description Text (17):
Preferably, the service equipment applications for service equipment 190 are written using Microsoft Developer Studio and ActiveX technologies. This is because the ActiveX programmer is not required to know the details of communicating information over the network to write an application. The sharing of information is accomplished within the computer operating system software (such as Windows), not the application software written by the programmer. This way, applications can be written as a stand alone program, and then later connected to the HTTP network when it is desired to share information, with few or no modifications to the underlying program. Each of the servers may also utilize Java or CGI scripts as appropriate to carry out specific functions that are best handled by those kinds of tools. For example, Java conveniently supports animation. CGI supports form based database searching.

Current US Cross Reference Classification (1):
701/29

Other Reference Publication (7):
Williams, Al, Developing Active Web Controls, Chapters 1 and 6-9. Coriolis Group Books, 1996.

CLAIMS:

1. An automotive service equipment system for use in conducting a diagnostic analysis of vehicle components, comprising:

at least one measurement device;

a data input controller having access to a first software;

at least one networked controller coupled to the data input controller over a data transmission network; and

an output device coupled to the data input controller;

wherein the measurement device is operatively coupled to the data input controller and configured to provide signals to the data input controller representative of a vehicle diagnostic state;

wherein the at least one networked controller has a memory for storing a software object representative of a second software necessary for conducting the diagnostic analysis of vehicle components; the second software comprising a vehicle diagnostic specification;

wherein the data input controller is configured for:

executing the first software;

accessing, in response to a request generated by executing the first software, over the data transmission network the software object; and

converting the signals representative of a vehicle diagnostic state, based on the vehicle diagnostic specification, to an output signal at the output device indicative of the vehicle diagnostic state.

3. The system of claim 1 wherein the data transmission network employs hypertext transmission protocol (http).

4. The system of claim 1 wherein the at least one networked controller is configured for processing measurement data derived at least in part from the signals and transmitting the processes measurement data to the data input controller over the data transmission network.

5. The system of claim 1 wherein the memory further stores one or more objects representative of one or more from the set of: vehicle owner information, a diagnostic computational routine, an automotive service operator instruction, and customer account information.

10. The system of claim 1 wherein the automotive service equipment comprises a computerized wheel alignment system, the at least one measurement device comprises at least one wheel alignment sensor, the signals comprise signals representative of wheel alignment angles, and the output indicative of the vehicle diagnostic state comprises an output indicative of the difference between measured wheel alignment angles and a wheel alignment angle specification.

11. The system of claim 10 wherein the data input controller and the at least one network controller communicate over the data transmission network using DCOM technologies, and wherein the output indicative of the difference between measured wheel alignment angles and a wheel alignment angle specification comprises a real-time DCOM display showing the difference between measured wheel alignment angles and a wheel alignment angle specification.

13. The system of claim 1 wherein one of the following types of automotive service equipment comprises the data input controller: engine analyzer, wheel alignment system, brake tester, suspension analyzer, wheel balancer; and one of the following types of automotive service equipment comprises the at least one networked controller: engine analyzer, wheel alignment system, brake tester, suspension analyzer, wheel balancer.

14. The system of claim 13 wherein the type of automotive service equipment which comprises the data input controller is different from the type of automotive service equipment that comprises the at least one networked controller.

15. The system of claim 1 wherein the data input controller comprises a browser and the at least one network controller comprises a server.

16. The system of claim 1 wherein the data input controller and the at least one network controller communicate over the data transmission network using DCOM technologies.

18. The system of claim 1 wherein the output device comprises a display, the data input controller comprises a Java Virtual Machine, the at least one network controller is configured to transmit Java applets to the data input controller over the data transmission network, and the data input controller is configured to utilize the Java Virtual Machine for displaying on the output device the Java applets.

20. The system of claim 1 wherein the data input controller comprises a thin client and the at least one network controller comprises a server.

21. The system of claim 1 wherein both the data input controller and the at least one network controller are located at the same vehicle servicing site.

22. The system of claim 21 wherein the data transmission network comprises a local area network (LAN).

23. The system of claim 1 wherein the data input controller is located at a vehicle

servicing site and the at least one network controller is located remote from that vehicle servicing site.

24. The system of claim 1 further comprising a second networked controller coupled to the at least one networked controller and the data input controller over the data transmission network, the second networked controller adapted to access the same software object in the memory of the at least one networked controller at substantially the same time as the data input controller.

25. The system of claim 24 wherein the second networked controller comprises an item of automotive service equipment.

26. The system of claim 24 wherein the second networked controller comprises a customer accounting database.

27. A computerized wheel alignment system comprising a plurality of alignment angle sensors adapted to be mounted on vehicle wheels to sense wheel alignment angles, a computer coupled to the plurality of sensors and adapted to receive therefrom signals indicative of wheel alignment angles, a display coupled to the computer and adapted to display the respective wheel alignment angles, the improvement comprising:

a connection to a data network;

the computer having access to a first software and coupled to the connection to the data network for receiving information from at least one networked controller;

wherein the computer is configured for:

executing the first software;

accessing, in response to a request generated by executing the first software, over the data network a software object representative of a second software necessary for conducting a wheel alignment procedure; the second software comprising a wheel alignment specification stored in the at least one networked controller; and

converting the signals indicative of wheel alignment angles, based on the wheel alignment specification, to an output signal at the display indicative of the wheel alignment state.

30. The system of claim 27 wherein the web browser comprises an ActiveX control.

31. An automotive service equipment system for use in conducting a diagnostic analysis of vehicle components, comprising:

at least one measurement device;

a data input controller having access to a first software;

at least one networked controller coupled to the data input controller over a data transmission network; and

an output device coupled to the data input controller;

wherein the measurement device is operatively coupled to the data input controller and configured to provide signals to the data input controller representative of a vehicle diagnostic state;

wherein the at least one networked controller has a memory for storing a software object representative of a second software necessary for conducting the diagnostic

analysis of vehicle components;

wherein the data input controller is configured for:

executing the first software;

accessing, in response to a request generated by executing the first software, over the data transmission network the software object; and

converting the signals representative of a vehicle diagnostic state, based on information contained in the software object, to an output signal at the output device indicative of the vehicle diagnostic state.

32. The system of claim 31, wherein the at least one network controller is further configured for calculating a usage fee based on the number of times the software object being accessed by the data input controller.

33. The system of claim 31, wherein the at least one network controller is further configured for calculating a usage fee based on the duration the software object being accessed by the data input controller.

Previous Doc Next Doc Go to Doc#

L1: Entry 3 of 4 File: USPT May 25, 1993

US-PAT-NO: 5214582
DOCUMENT-IDENTIFIER: US 5214582 A
**** See image for Reexamination Certificate ****

TITLE: Interactive diagnostic system for an automotive vehicle, and method

DATE-ISSUED: May 25, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Gray; Moshe	Los Altos Hills	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Edge Diagnostic Systems	Sunnyvale	CA			02

APPL-NO: 07/ 647774 [PALM]
DATE FILED: January 30, 1991

INT-CL: [05] G01M 15/00, G06F 11/00

US-CL-ISSUED: 364/424.03; 364/431.11, 364/551.01, 73/117.3
US-CL-CURRENT: 701/33; 340/439, 701/114, 701/29, 701/31, 701/32, 702/182, 73/117.3

FIELD-OF-SEARCH: 364/42.03, 364/42.04, 364/431.11, 364/578, 364/551.01, 73/117.2, 73/117.3

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4300205	November 1981	Tansuwan	364/578
☐	4757463	July 1988	Ballou et al.	364/551.01
☐	4796206	January 1989	Boscove et al.	364/431.01
☐	4862371	August 1989	Maekawa	364/431.11
☐	5003477	March 1991	Abe et al.	364/424.03
☐	5041976	August 1991	Marko et al.	364/424.03
☐	5077670	December 1991	Takai et al.	364/424.03

ART-UNIT: 234

PRIMARY-EXAMINER: Black; Thomas G.

ATTY-AGENT-FIRM: Ware & Freidenrich

ABSTRACT:

An interactive diagnostic system is disclosed herein for use with an automotive vehicle of the type including a network of sensors and actuators for independently sensing and actuating a number of different functions within the vehicle and an onboard computer for monitoring the sensors and controlling the operation of the actuators. This system provides the automotive service professional with all of the tools necessary to provide precision diagnostic testing on todays computer-controlled cars. This is accomplished by providing the system with means including an external computer for controlling operation of one or more specific actuators independent of the onboard computer and for simulating the operation of specific sensors independent of the actual operation of these latter sensors. At the same time, the electronic data entering and exiting the onboard computer including the actual data associated with the network of sensors and actuators can be continuously monitored and analyzed by the external computer. In this way, the automotive service professional is able to quickly and easily test and trouble shoot the performance of a vehicle's onboard computer and engine electronics down to the component level including specifically its entire network of sensors and actuators.

32 Claims, 5 Drawing figures

Previous Doc Next Doc Go to Doc#

L1: Entry 4 of 4 File: USPT Oct 15, 1991

US-PAT-NO: 5058044
DOCUMENT-IDENTIFIER: US 5058044 A

TITLE: Automated maintenance checking system

DATE-ISSUED: October 15, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Stewart; Stedman J.	Littleton	IL		
Barbour, Jr.; Charles A.	Thornton	IL		
Breeden; Howard E.	Oak Brook	IL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Auto I.D. Inc.	Lakewood	CO			02

APPL-NO: 07/ 331278 [PALM]
DATE FILED: March 30, 1989

INT-CL: [05] G06F 15/20, G01D 3/00

US-CL-ISSUED: 364/551.01; 340/825.54, 346/33R, 364/424.04
US-CL-CURRENT: 702/184; 340/10.41, 346/33R, 701/35

FIELD-OF-SEARCH: 364/550, 364/551.01, 364/464.01, 364/424.04, 364/465, 364/467, 364/424.03, 364/479, 364/510, 340/825.3, 340/825.31, 340/825.54, 340/933, 340/941, 340/438, 340/439, 346/33R, 346/33MC

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	3090042	May 1963	Kleist et al.	343/6.5
☐	3377616	April 1968	Auer, Jr.	340/23
☐	3530434	September 1970	Stites et al.	340/149
☐	3639731	February 1972	McNeill	235/61.11
☐	3665397	May 1972	Di Napoli et al.	340/147

☐	3689885	September 1972	Kaplan et al.	340/152
☐	3859624	January 1975	Kriofsky et al.	340/941
☐	4072850	February 1978	McGlynn	364/424.04
☐	4188618	February 1980	Weisbart	364/424.04
☐	4258421	March 1981	Juhasz et al.	364/424.04
☐	4267569	May 1981	Baumann et al.	364/424.04
☐	4344136	August 1982	Panik	364/424.04
☐	4388524	June 1983	Walton	340/825.3
☐	4398172	August 1983	Carroll et al.	340/825.54
☐	4404639	September 1983	McGuire et al.	364/424.04
☐	4490798	December 1984	Franks et al.	364/550
☐	4525782	June 1985	Wohlfarth et al.	364/424.04
☐	4550444	October 1985	Uebel	340/825.54
☐	4603390	July 1986	Mehdipour et al.	364/467
☐	4630044	December 1986	Polzer	340/825.54
☐	4658371	April 1987	Walsh et al.	364/550
☐	4665395	May 1987	Van Ness	340/825.31
☐	4677429	June 1987	Glotzbach	364/424.04
☐	4714925	December 1987	Bartlett	340/825.54
☐	4731867	March 1988	Seabury et al.	340/941
☐	4757463	July 1988	Ballou et al.	364/424.04
☐	4831539	May 1989	Hagenbuch	364/424.04

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
2563028	October 1985	FR	

OTHER PUBLICATIONS

"Budget to Test Automated Return System," Automotive Fleet, Dec. 1987, p. 130.
"Put a Sensor in Your Tank," High Technology Business, Jun. 1988, vol. 8, No. 6, p. 11.

ART-UNIT: 234

PRIMARY-EXAMINER: Teska; Kevin J.

ATTY-AGENT-FIRM: Leydig, Voit & Mayer

ABSTRACT:

A system for automatically identifying vehicles, assimilating data from an identified vehicle, correlating the data with predetermined data and providing a

statement of account indicative of a transaction involving the vehicle. The system also provides a service record of the vehicle for use in connection with the transaction. For example, in a car rental environment, the service report is utilized by an attendant to determine if such service items as refilling the fuel tank are necessary. Primarily, data for the service record is provided by sensors located on-board the vehicle. The sensor data may be supplemented by data inputted via a keyboard located on-board the vehicle.

13 Claims, 13 Drawing figures

Previous Doc Next Doc Go to Doc#

L1: Entry 1 of 4 File: USPT Sep 17, 1996

US-PAT-NO: 5557268
DOCUMENT-IDENTIFIER: US 5557268 A

TITLE: Automatic vehicle recognition and customer automobile diagnostic system

DATE-ISSUED: September 17, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hughes; Gerard J.	Washington	NJ		
Duncan; Leonard J.	Bridgewater	NJ		
Goshorn; David P.	Flemington	NJ		
Stokes; James P.	Flemington	NJ		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Exxon Research and Engineering Company	Florham Park	NJ			02

APPL-NO: 08/ 393629 [PALM]
DATE FILED: February 24, 1995

PARENT-CASE:
This is a continuation of application Ser. No. 991,814, filed Dec. 16, 1992, now abandoned.

INT-CL: [06] G08 G 1/01

US-CL-ISSUED: 340/933; 340/938, 364/424.03, 364/424.04
US-CL-CURRENT: 340/933; 340/938, 701/38, 701/35

FIELD-OF-SEARCH: 340/933, 340/938, 340/943, 364/424.03, 364/424.04, 345/825.34, 345/825.54, 345/439

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4404641	September 1983	Bosernik	364/424.03
☐	4532511	July 1985	Lemelson	340/933

☐	5003476	March 1991	Abe	364/424.04
☐	5058044	October 1991	Stewart et al.	364/424.04
☐	5072380	December 1991	Rendelman	369/406
☐	5196846	March 1993	Brockelsby et al.	340/933

ART-UNIT: 267

PRIMARY-EXAMINER: Peng; John K.

ASSISTANT-EXAMINER: Lefkowitz; Edward

ATTY-AGENT-FIRM: Hantman; Ronald D.

ABSTRACT:

The present invention is a system and method for identifying a vehicle for the purpose of displaying diagnostic information to the driver. Each vehicle includes a transponder that transmits an encoded character sequence that is unique to that vehicle. In this way vehicle diagnostic measurements made at the establishment entrance can be associated with the vehicle, and displayed to the customer when the vehicle is recognized again at a service area.

20 Claims, 12 Drawing figures

Previous Doc Next Doc Go to Doc#

L1: Entry 2 of 4 File: USPT Jul 16, 1996

US-PAT-NO: 5537315
DOCUMENT-IDENTIFIER: US 5537315 A

TITLE: Method and apparatus for issuing insurance from kiosk

DATE-ISSUED: July 16, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mitcham; Martin K.	Richardson	TX	75080	

APPL-NO: 08/ 216667 [PALM]
DATE FILED: March 23, 1994

INT-CL: [06] G06 F 17/60

US-CL-ISSUED: 364/408; 364/DIG.1, 364/DIG.2, 364/918, 364/918.5, 364/225, 364/227.3

US-CL-CURRENT: 705/4

FIELD-OF-SEARCH: 364/DIG.1MSFile, 364/DIG.2MSFile, 364/400, 364/401, 364/406, 364/407, 364/408, 395/100, 395/101, 395/104, 395/118, 395/129, 395/144, 395/145, 395/146, 395/147, 395/148, 395/149, 395/153, 395/154, 395/155, 395/156, 395/157, 395/158, 395/159, 395/150

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4648037	March 1987	Valentino	364/408
☐	5049862	September 1991	Dao et al.	340/706
☐	5297202	March 1994	Kapp et al.	380/9

ART-UNIT: 235

PRIMARY-EXAMINER: Harrell; Robert B.

ATTY-AGENT-FIRM: Harris, Tucker & Hardin

ABSTRACT:

A method and system in a data processing system for automatically associating a user's signature with a document. The data processing system includes a touchscreen display, a central processing unit, a data storage system, at least one document stored within the data storage system, and a pointing device. A document is specified within the data processing system. A signature is received in response to the user touching the touchscreen utilizing the pointing device. A signed document is then created by automatically associating the signature with the document.

7 Claims, 21 Drawing figures

Previous Doc Next Doc Go to Doc#